

Darwinian
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Should Methodological Adaptationism be Replaced?

Abstract: Elizabeth Lloyd has objected to Methodological Adaptationism (MA) on the grounds that it misleads Science, so she is trying to motivate the idea that it can be replaced with an Evolutionary Factors (EF) framework. Her main argument is that the latter framework is more fruitful for scientific discoveries than MA. However, *fruitfulness* is a vague term, and she uses it as such—therefore, using a recent explication of *fruitfulness*, I shall assess her claims. Highlighting junk DNA and evolutionary medicine, I will show how MA is more fruitful than the EF approach because we have epistemic and non-epistemic reasons to privilege adaptive answers. In essence, privileging these adaptive answers circumvents most of Lloyd's criticism, so I conclude that MA should not be replaced.

Introduction

In the 40 years since Gould and Lewontin's landmark paper "The spandrels of San Marco and the Panglossian paradigm: a critique of the adaptationist programme", the biological community is thought to have, by and large, adapted to their criticism. Gould and Lewontin had served several charges against the adaptationist camp, namely ad hoc rationalizations, questionable standards of evidence, and paying lip service to alternatives. Some biologists downplayed the issues raised, while others were more conciliatory and tried to make adaptationist reasoning more robust. Following their paper, there has been a great deal of

development in the field—that is, from defining different types of adaptationism to more scrutiny of just so stories.

While the debate has centred around evidentiary standards, Elizabeth Lloyd has recently raised investigative issues around MA. Essentially, she argues that lessons from Gould and Lewontin are harder to implement because adaptive thinking begins with initial research questions that lead to "closed-mindedness, and the inability to see alternatives, or evaluate evidence"¹ and, therefore, to scientific failure. Lloyd has expanded upon the objections of the original Spandrels paper, and she has also raised some significant novel challenges to MA. Her argument is that there are reasons to replace MA with an alternative: the EF approach. I shall argue against Lloyd's claim that MA should be replaced by the EF approach.

Lloyd's Argument Against Methodological Adaptationism

After Gould and Lewontin's paper, three distinct varieties of adaptationism have been put forward. MA is the most popular one. Defining MA, Peter Godfrey-Smith says, "The best way for scientists to approach biological systems is to look for features of adaptation and good design. Adaptation is a good 'organizing concept' for evolutionary research."² Note that this claim is not the same as the idea that the biological world is saturated with adaptations, or that selection is a prevalent and powerful force with little constraints (this is known as empirical adaptationism). Under MA, it may even be assumed that very few adaptations actually exist. In essence, there are two types of MA: strong and weak. The latter sees adaptationism as one strategy to understand biological

traits. The Strong form is the view that assumes adaptationism as both a starting point and the only route to discover the actual status

1 Lloyd 2015, p343

2 Godfrey-Smith 2001, p337

of traits, regardless of whether or not they turn out to be adaptive. Although Lloyd does not make use of the distinction between strong and weak forms of adaptationism, it is clear that her claims are against the stronger form. Lloyd argues that asking different questions can expand or constrain classes of answers, which she refers to as the “logic of research questions.” Her depiction of MA inspired the following research question: What is the function of this trait?

The answers allotted by the aforesaid question are all in the form of the following:

The function of the trait is X. The function of the trait is Y. The function of the trait is Z. Etc.

Lloyd acknowledges that proponents of MA accept that if a functional answer fails then a non-adaptive explanation can be explored. However in practice she thinks non-adaptive answers never seen the light of day. She contrasts MA with the EF approach. Although EF is used by some biologists Lloyd believes MA is still subscribed to by the majority. Lloyd explains EF research question as:

“What Evolutionary Factors account for the form and distribution of this trait?” Or rather, “Does this trait have a function?”

This question has a series of possible distinct answers (that can be considered in any order, but, usually, in practice, the adaptive answers go first):

Possible Answers:

A: This trait occurs in the population because it has the function F (i.e., the trait is an adaptation).

A: This trait occurs in the population because it has the function G (i.e., the trait is an adaptation).

A: This trait occurs widely in this population because it is genetically linked to a trait that is highly adaptive in this species (genetic linkage or correlation).

A: This trait has its current form largely because of an ancestral pattern (phyletic inertia). A: This trait has its current form and distribution because of pleiotropy with a trait that was under natural selection (pleiotropy or byproduct).

A: This trait has its current form and distribution because it is a byproduct (or bonus) of a trait that is strongly selected in the opposite sex of this species (byproduct or

bonus of an adaptation).

A: This trait has its current form and distribution because of some combination of the above factors.

Etc.3

It is clear that the EF approach permits more types of answers. Thus, Lloyd believes this approach should replace MA as the default method because it is more fruitful. She sees EF as the best of both worlds. Functional answers are available as a first go-to algorithm and, afterward, if these do not work, non-adaptive answers are tested. Lloyd makes her case against MA by pointing out problems that she thinks mislead science and, therefore, make it less fruitful as a research programme. To that belief, Lloyd raises five specific problems with the MA programme; (1) The disappearance of the “onerous burden of proof”; (2) mistaking

3 Lloyd 2015, p346

non-adaptive alternatives as mutually exclusive instead of as complementary or cooperative accounts; (3) the lack of a “stopping rule” for functional answers; (4) loss of ability to evaluate and weigh evidence for alternative causal hypotheses; and (5) treating non-adaptive answers as a “Null” Hypotheses.⁴ These problems, she contends, make MA less fruitful as a research programme.

Disappearance of the Onerous Burden of Proof

Lloyd raises the issue pertaining to the disappearance of the “Onerous Burden of Proof”. She defines evolutionary adaptations as current traits that developed in the past history of the organism, which is due to selective pressures being applied to an assortment of phenotypes. Lloyd claims adaptationists have set a high standard for themselves in order to detect traits that are adaptations. That is, they have never had a problem with embracing the burden of proof and, clearly, they have specified what it entails. Lloyd cites Paul Andrews and George Williams as acknowledging that the demonstration of adaptation “carries an onerous burden of proof.” Williams suggested some qualities of a trait in order to detect design—such as precision, efficiency, and economy⁵—however, what he actually desired was the development of “sets of objective criteria [of special design].”⁶ Lloyd points out that Williams, in practice, accepted something less than the rigorous objective criteria he proposed to detect adaptations. However, Williams is not alone in this because, in general, adaptationists only pay lip service to the burden of proof with which they are supposed to work. Nevertheless, for Lloyd, this is not even the worse part because their research question—“What is the function of this trait?”—has hidden the burden of proof. That is, they have replaced the assumption of

4 Lloyd 2015, p347–356

5 Williams 1966, p503

6 Williams 1966, p9

adaptation—which was only supposed to be a research heuristic—with a claim about its actual existence. Another issue she raises concerns the definition of adaptation. Skipping Elliot Sober's widespread definition for detecting adaptations, the adaptationists are using a watered down definition. Sober's definition links the function as well as the selective process that lead to it in a clear way, explaining, “A is an adaptation for task T in

population P if and only if A became prevalent in P because there was selection for A, where the selective advantage of A was due to the fact that A helped perform task T.”⁷ Knowing the difficulties this would cause them, adaptationists are motivated to decoupling this history-laden definition. Behavioural ecologists Reeve and Sherman argue in favor of such a revision. They think the problem inherent within Sober’s definition is devastating for methodological adaptationists, such as themselves. Reeve and Sherman believe Sober’s definition “may be sufficient to implicate a trait as an adaptation,” but “such criteria are not necessary to recognize adaptations.”⁸ If Sober’s definition is used, the majority of traits that are currently considered to be adaptations will be downgraded to non-adaptations. Stripping traits of their adaptive status would be a result of Sober’s definition requiring us to know that the trait spread through the population via natural selection working on varying phenotypes. Thus, Reeve and Sherman argue for a separation of the current function and the historical process that lead to said function. For the methodological adaptationist camp, work would be much easier if Reeve and Sherman’s definition were to be adopted. Their definition is that, “An adaptation is a phenotypic variant that results in the highest fitness among a specified set of variants in a given environment.”⁹ Of course, one should note that this definition is elastic enough to count the majority of traits as adaptations. That is, inference from a trait’s current function to its past selection is sufficient for a trait to be classified as an adaptation. Under

⁷ Reeve & Sherman, 1993, p7

⁸ Ibid

⁹ Reeve & Sherman 1993, p1

Sober’s definition, such an inference would not be allowed. Even before Reeve and Sherman’s definition was penned, methodological were applying it in practice. Lloyd’s problem is, more or less, that adaptationists are guilty of shrinking their own “onerous burden of proof.” All told, this perk cannot be enjoyed because she desires Sober’s definition to be employed.

Mistaking Complementary Accounts as Mutually Exclusive

Methodological adaptationists see non-adaptive answers as mutually exclusive to adaptive ones. According to Lloyd, this approach puts adaptationists at a disadvantage. Within the EF framework, hypotheses of spandrels, genetic and developmental constraints, drift, and exaptations can be welcomed as complementary accounts. These limit the selective options and, also, they are needed in order to explain how an optimum adaptation is achieved.

Conversely, adaptationists have set up a false dichotomy—that is, either a trait is an adaptation or it is not. Adaptive hypothesis for a trait has to be considered first, and then, if repeated attempts fail, a trait may be considered a non-adaptation. For a non-adaptive hypothesis to be considered, it is necessary for an adaptive hypothesis to be generated and exhaustively invalidated. Adaptationists have set up adaptive and non-adaptive answers as exhaustive disjuncts. Essentially, increasing confidence in adaptive answers decreases confidence in non-adaptive ones. According to Lloyd, such a belief regarding confidence is a logical claim, not an empirical one. As such, it evades the empirical considerations. However, confidence should rely upon empirical data, so this will help us to detect the true status of traits. Therefore, Lloyd thinks adaptationists mislead science by using this staunch dualist approach.

The Lack of a Stopping Rule

Regarding the stopping rule problem, Lloyd reignites the complaints of Gould and Lewontin. They raised two interconnected issues pertaining to the continuous generation of adaptive hypotheses and the infamous *just so* storytelling. While adaptationists have claimed to have adapted their approach to these problems, Lloyd believes lessons have not been learned because the blocking of non-adaptive answers as well as inadequate evidentiary standards are still in practice. Adaptationists have proposed that, by falsifying adaptive hypotheses, they are increasing confidence in non-adaptive answers whilst, eventually, switching over. Lloyd argues that, in practice, this does not work because adaptative accounts are endlessly generated. The reasoning for this is that adaptationists still fail to distinguish between speculative hypotheticals—that are consistent with natural selection—and evidence-based hypotheses. Regardless, Lloyd does not think much progress has actually been achieved on this front—that is, except for granting lip service to the existence of these problems.

To further develop the stopping rule problem, Lloyd provides the adaption of the glass tree frog as an example. Because the environment within which this species resides has green leaves, it was thought that glass tree frogs—akin to other tree frogs—evolved to be green. However, an interesting difference is the fact that, while regular tree frogs acquired their colour through the absorption of sections of the visible light spectrum, glass tree frogs acquired their green by refracting light. That said, it was not clear if this was a relevant difference that had implications for their respective adaptations. Nevertheless, both types of frog were investigated under infrared light. It was later discovered that the leaves the regular tree frogs rest upon reflect infrared light, but the frogs themselves absorb it. Conversely the glass tree frogs like the leafs that they sit on reflect infrared and thereby become completely

disguised. Additionally, it was found that pit vipers were sharing the environment with glass tree frogs. This is significant because those particular snakes hunt using infrared sensitivity, so a refurbished adaptive account was formed. Clearly, this is an additional problem for the methodological adaptationist—that is, because one good adaptive account is not enough to warrant pausing the search for newer adaptive accounts. The stoppage problem has been reinforced by Lloyd in a novel way.

Loss of Ability to Evaluate and Weigh Evidence

In the rare cases when a methodological adaptationist considers non-adaptive answers, they still face an uphill struggle. The ability to weigh evidence from non-adaptive and adaptive hypotheses is sometimes lost. According to Lloyd, MA uses a lens that distorts what is actually going on. To explain this, she highlights her flagship case: the female organism.¹⁰ Over the years, Lloyd has scrupulously eliminated every adaptive account for this trait. She argues it is a byproduct (her preferred term is “fantastic bonus”) that is due to the stabilizing selection of the male organism. In 1979, Donald Symons was the first to present evidence of the female organism being a byproduct. Symons view was not singularly based upon the rejection of adaptive accounts, for it also had independent evidence. To Lloyd's disappointment, Symons's view has either been dismissed or outright ignored as a baseless *a priori* assertion. Reasoning for this is that the methodological adaptationist research question blocks any non-functional answer from appearing. Lloyd cites Andrews's reaction as a standard misplaced methodological adaptationist attitude. Andrews contended that the argument for a byproduct account was invalid because it lacked a strategy to reject the

¹⁰ Lloyd 2006

adaptive hypothesis.¹¹ Regardless, the positive evidence for the byproduct view—which included developmental symmetries—were invisible to adaptationists. This is because their radars do not detect drift, persistent lack of genetic variation, and rigid genetic correlations as alternative explanations. If anything, these viable evolutionary causes are substituted as tools that can aid in understanding the optimality of adaptations. In cases where the adaptationist does acknowledge the presence of these factors, they make unwarranted assumptions regarding them. Lloyd highlights how adaptationists deny the possibility that genetic correlations cannot be broken, and, also, that such correlations are assumed too insufficient to be a complete explanation for the distribution of traits. Instead, they attempt to explore the prospect that the genetically correlated traits are selectively maintained over potential alternatives. Thus, because of their initial research question, adaptationist eyes are colour blind to causally efficacious factors that are non-adaptive, which is why Lloyd thinks they can neither properly nor fairly weigh evidence.

Treating Alternatives as Nulls

Questions in the form of “What is the function of a trait x?” only limits answers to functional ones. In effect, this causes non-adaptive answers to be classified as nulls. Because nulls are negative results contrasting a positive alternative hypothesis, independent evidence cannot be accumulated for them. Lloyd stresses this would be a mistake because drift, phyletic inertia, and genetic constraints are alternative causal accounts for the form and distribution of traits. Therefore, they have their own independent evidence. While some adaptive researchers explicitly name non-adaptive hypotheses as nulls, other practitioners simply treat them as such by adhering to the function style questioning. In statistical analysis, while nulls are used

11 Andrews 2002a, p499

in a formal way, within adaptive camps, it is intended to be in an informal way. Relegating non-adaptive answers to nulls means only evidence for correlation with fitness counts as actual evidence for a positive hypothesis. While the null is simply a non-correlation with fitness, it is akin to a barren result as well as a scientific surrender.¹² Thus, independent evidence for non-adaptive answers is concealed and only becomes apparent within the EF approach. This framework initiates its enquiry with a particular question (“Does this trait have a function?”), but it can descend into another question (“What is the function of this trait?”), which, at that point, is the same function question that Lloyd claims is misleading science. Realizing this problem, she presents a simple solution. Both questions may look syntactically identical, but this does not necessarily mean that they are, logically, asking identical questions. Consider how the same question can be formed by adopting syntactically distinct sentences. Structural wording is a trifle bit logically arbitrary. In order to know what the research question logically entails, we must see what answers it permits. Although both competing approaches may be asking questions about function, the actual essence is unveiled when we catalog the live options that are actually allowed under each framework. EF allows non-adaptive answers while methodological adaptationists only pay lip service to such answers. But it is not enough to examine the verbal structure of questions, which means we need to analyze the logic of the research question itself. The EF framework does not lead to non-adaptive answers being labelled as null hypotheses—rather, it permits them to garner evidence that is independent and visible. However, the null hypothesis status consigned to non-adaptive answers is the result of the functional questioning of the methodological adaptationist. Contrary to the claims of adaptationists, their question is not a harmless preference to first explore functional questions. Therefore, researchers are soberly misled when they are exploring the actual status of traits.

12Alcock 1987

There is much debate regarding how to appraise competing scientific theories. However, Lloyd is clear that an EF approach is more fruitful and, hence, should be our default paradigm in evolutionary biology. To date, Lloyd's claims have gone unchallenged, so, below, what I intend to do is give a clear route that can undermine her central argument.

Lloyd's argument can be summarized as:

1. MA in practice does not allow non-adaptive answers.
2. EF allows both adaptationist answers and non-adaptive answers.
3. Between competing scientific frameworks, we should use fruitfulness as a criteria when deciding between them.
4. The EF approach is a more fruitful approach than MA because it allows more answers.

Conclusion: The EF framework should replace MA.

Defending Methodological Adaptationism

Lloyd has pointed out some problems with MA and, as a result, she wants it to be rejected as the default framework. Aside from her stance on using Sober's onerous definition of adaptations, I largely *agree* with Lloyd in regard to the problems she raises. Indeed, under MA, adaptive answers are given an immense privilege over non-adaptive ones. However, I do not agree that this gives us justification to replace MA with EF. The reason for this is that we

have epistemic and non-epistemic reasons to privilege MA. Lloyd wants us to start research on biological features by assuming that the traits we see are selectively neutral—that is, we do not know their actual status. Conversely, adaptationists ask us to reject all adaptationist explanations before we can even consider a non-selective account. Lloyd assumes the explicit privileging of MA is unwarranted, but I will argue against this. Here is my argument:

1. It is incorrect to assume the EF framework covers all the benefits of MA.
2. We have epistemic reasons for knowing adaptive answers are more fruitful than non-adaptive ones.
3. We have non-epistemic reasons to choose adaptive answers over non-adaptive ones.

Therefore, MA should not be replaced

What counts as an Adaptation?

Before I lay out the case for MA being more epistemically fruitful than EF, I am going to explain why I disagree with Lloyd with her regarding her use of Sober's definition. It is important to first clarify this point because, if we accept the Sober definition, much of what we consider adaptations would be relegated of their status, hence the fruitfulness of MA would hit a stumbling block. Lloyd points out that the "onerous burden of proof" that was put forth by prominent adaptationists is not put into practice. She is correct to note that Sober's conservative definition to detect adaptationists is ignored while Reeve and Sherman's more liberal one is employed. However, I do not see this as a problem. It could be argued that the adaptationists who proposed the onerous burden of proof were simply wrong to propose it. It is not abnormal for scientists to sometimes put forward criteria in order to confirm their

conclusions, which are later revised according to practical considerations. For example, the imperfection of the fossil record would change the way we set the criteria to confirm gradualism. A hypothetically perfect and preserved paleontological record would make the criteria stricter. In fact, this is one of the early problems that

Darwin noted in *On The Origin of Species*. The so-called Cambrian explosion—the appearance of fossils in the Cambrian period that seemed to suddenly appear (without intermediate transitional fossils)—challenged what one would expect if evolution gradually took place. Of course, due to the poor paleontological record, the phenomenon was explained by Darwin himself (as well as others after him) in such a fashion: “Why then is not every geological formation and every stratum full of such intermediate links? Geology assuredly does not reveal any such finely-graduated organic chain; and this, perhaps, is the most obvious and serious objection which can be urged against the theory. The explanation lies, as I believe, in the extreme imperfection of the geological record.”¹³ It would be unfair to criticise gradualism by the fact that most species in that period never fossilized. Moreover, it is not reasonable to expect a linear fossil record to show each gradual step.

In our case, there is no reason to suppose that the “onerous burden of proof” is necessary at all. Lloyd did not make an effort to explain why Sober’s definition is the correct one. Perhaps she assumed that, because Sober’s definition is widespread, it should be taken for granted.

Maybe this seemed to be a reasonable approach—from her perspective, at least—but it is still questionable. Lloyd may argue that Reeve and Sherman need to provide sound reasoning in order to accept their definition—that is, apart from speaking about the difficulties of using Sober’s definition and, also, the ease of using their own. Reeve and Sherman did not actually justify why their definition is correct, either. However, I think a case can be made for their

13 Darwin 1860, p280

definition, which would be, more or less, a case against Sober’s definition. Starting with an example that Lloyd herself gives:

In the ancestral population of anteaters, for instance, which resembled armadillos, tongue length was likely highly variable, with high fitness values accruing to those anteater-ancestors that might be able to reach into ant nests with their long tongues and eat the most ants, and were thus most able to pursue their food resources. These longer-tongued anteater-ancestors—eventually with their 25-inch-long tongues—would represent the best fit—or closest-to-best fit—to their environment.

The anteater example thus presents a good instance of a natural selection explanation that reinforces or produces an adaptation.¹⁴

Applying Sober’s definition, we would require more information before we could class the anteater tongue as an adaptation. Essentially, his definition requires that we know that a trait T was selected in population P. Although Lloyd writes that the tongue length was “likely highly variable,” that is not quite enough. How does she know that was the case? It simply cannot be taken as self-evident. A historical record of anteaters with various tongue lengths—with only the longer ones surviving—would be necessary in order to, according to Sober’s definition, detect an adaptation. Surveying the paleontological record of the suborder Vermilingua (which is formed of the four extant mammals commonly referred to as anteaters) is a problematic task because anteaters diverged from sloths in the Early Eocene. Fossils of anteaters in this period are sparse.¹⁵ The earliest fossils of the extinct and extant genera of anteaters is very difficult to reconstruct. Some fossils have been discovered to have long muzzles (and therefore long tongues), but we do not have a clear range of sizes. Therefore,

14 Lloyd 2015, p347–356

under the very definition to which Lloyd is subscribing, a trait that she *accepts* is an adaptation cannot be classified as one. Conversely, Reeve and Sherman's definition would allow us to count the anteater tongue as an adaptation. To do so, all that would be needed would be a simple inference from current function to a selective causation. The incompleteness and fragmentary nature of the anteater fossil record is no different from that of other animals, so detecting adaptations using Sober's definition would be a general problem. Thus, we have good reason to trust the Reeve and Sherman definition. Obviously, Lloyd may object that Reeve and Sherman's definition casts the net too far. For instance, she could point out that a fitness enhancing trait does not necessarily have to be a product of selective pressures. Such traits have been labelled as exaptations.¹⁶ Exaptations have been defined in two ways: (1) "[A] feature, now useful to an organism, that did not arise as an adaptation for its present role, but was subsequently co-opted for its current function"¹⁷ and

(2) "features that now enhance fitness, but were not built by natural selection for their current role."¹⁸ Her point would be valid as there is a clear risk of non-adaptive traits being labelled as adaptive ones. While it is true that the definition used by methodological adaptationists involves such a risk, there is, likewise, a similar risk involved with Sober's definition. In order to make it easier to decide between the two definitions, we can introduce Lloyd's own belief about adaptation in nature. In relation to the adaptation of the anteater muzzle, she notes, "I take it as given that our living world is filled with examples of such adaptations."¹⁹ If she maintains this assumption about the biosphere, one would expect her to advocate for Reeve and Sherman's definition. Indeed, it is somewhat of an endeavour to comprehend why Lloyd would adopt Sober's definition when doing so would cause the *en masse* disappearance of traits that are currently labeled as adaptations, which, of course, would not

¹⁶ Gould 1982

¹⁷ Gould 1991, p43

¹⁸ Ibid

¹⁹ Lloyd, 2015, p344

fit her assumption of abundance of adaptations. That said, I would sympathise if we had a much clearer fossil record maybe Sober's definition would not be too demanding. However, due to the poor paleontological record, it would be impractical to deploy such a definition—in fact, it would seem uncontroversial to bypass Sober's definition.

Although Reeve and Sherman penned their definition two decades ago, its actual use has been widespread, going all the way back to the mid 19th century. Essentially, Darwin indulged in the type of adaptive thinking that Lloyd is complaining about. Indeed, he was using the loose definition that Reeve and Sherman propose for making predictions. In 1862, Darwin came across a rare orchid flower from Madagascar called *Angraecum sesquipedale*. It had a bizarrely deep nectar reservoir. Darwin candidly made two bold predictions. First, he claimed that the unusual plant had developed an adaptation and, second, that there was a

yet-to-be-discovered long-tongued moth with which the flower had a co-evolutionary relationship.²⁰ This supposed moth had never been seen, so Darwin's account was criticized by entomologists. However, he was still adamant that the moth existed and had a tongue of 10–11 inches. After Darwin's death in 1903, 20 years later,

the illusive moth was finally found. It is important to note how the structure of the flower was enough for him to label both the orchid and the moth as having adapted to each other, for there was no history of the moth or the orchid flower that he had at hand in order to make this claim. Under Sober's definition, Darwin would not have been able to call this an adaptation. Biologists since Darwin have used a loose definition of adaptation (such as that of Reeve and Sherman, which is based on current utility without a history of the trait within the population) to make novel discoveries, so to give that up would not make sense—that is, unless Lloyd happened to have a good argument, which, so far, she has not made. Even if we assume that Lloyd can successfully

20 Darwin 1862, p197–203

argue against Reeve and Sherman's definition—whilst projecting Sober's definition as the correct one—there is still a way to undermine her. One thing that is clear is how Reeve and Sherman's definition carries the risk of labelling non-adaptations as adaptations while, in the same context, Sober's definition has the opposite risk of labeling adaptations as

non-adaptations. As we shall see later, the epistemic and non-epistemic benefits of detecting adaptations is worth the false positives that Reeve and Sherman's definition may cause.

What is Fruitfulness?

Debates considering the evaluation of competing scientific theories and approaches are an unsettled matter. However, there is a general agreement upon which list of values should compose scientific appraisal, and these include consistency, accuracy, simplicity, scope, and fruitfulness.²¹ Debates among philosophers regarding the performance and definitions of these values persists. In essence, fruitfulness is a vague term and Lloyd uses it as such.

Despite the fact that fruitfulness is included in most lists of scientific virtues, it has been deprived of philosophical attention that has been, instead, granted to other virtues. One can easily find papers on simplicity, but very little work has been done to elucidate fruitfulness as well as its role in the assessment of scientific methodologies and theories. This is not inconsequential, as Silvia Ivani points out, “the problem with fruitfulness is that it can be easily ascribed to many programs because its definition is loose and no clear strategy for assessing it is provided.”²² Recently, Ivani (2019) has worked to develop a more precise definition of fruitfulness. Her definition is the “ability of research programs to

21 Khun, 1977, p320–339

22 Ivani 2019, p3

develop”²³—that is, where development is when we advance our understanding of the world. Specifically, Ivani has epistemic goods—such as a novel hypothesis in mind—because a fruitful programme develops by gifting us with quality innovative hypotheses to test. Having methods to assess the fruitfulness of programmes is important, too. Here, Ivani suggests that, in our evaluation of research programs, we should turn to *research questions* and *discovery heuristics*. Both these tools are used by scientists in order to arrange and outline research as well as generate novel hypotheses. Research questions and discovery heuristics broaden, direct, and set the parameters of the content of research programmes.

Wording of research questions is crucial. Science is, essentially, a question answering process, so the questions we ask play a vital role in expanding our understanding of the world. Questions set the direction for what is and is not of interest, and where to begin our quest. As Sven Lundstedt puts it, “initial scientific questions, like first impressions, carry a great deal of weight in shaping the direction of a system of thought.”²⁴ For example, consider the research questions below:

1. What is the evolutionary function of human guilt?
2. Is human guilt an evolutionary byproduct?
3. What is the link between smoking and stress?

While each of these questions allows a class of answers, they still forbid others. Hence, questions are vital to measure fruitfulness because they constrain or broaden the development of research programmes. Moreover, research questions guide research methodology—sample

23 Ivani 2019, p6

24 Lundstedt 1968, p229

size, what data is important, what data is not important—and they fundamentally limit answers that count as legitimate. The formulation of research questions depends on the background assumptions of scientists. As Ivani explains, these “assumptions can be of different sorts, e.g. moral, political, and methodological, and their importance can vary across contexts.”²⁵

Research questions are composed of three dimensions, which are *focus*, *aim* and *orientation*. In the case of (b), the focus would be on psychological traits. The aim is to see *if* there is a function to the particular trait, orientation is the path that the study shall follow in order to develop. Questions (a) and (b) are based upon differing assumptions pertaining to the role of selection in the formulation of human emotions, which the former may assume to be empirical or explanatory adaptationism while the latter will not. All told, question (a) cannot be answered with “Human guilt is a spandrel” because the aim of the question only allows functional answers. However, question (b) would allow such an answer because the question’s orientation allows for both functional and non-adaptive answers. A question such as (c) might be based on a moral assumption that human well-being is our primary concern, and that we should better our understanding of those things that harm our health. Of course, only certain types of answers would be legitimate for this question—for example, “There is no correlation between smoking and stress” would not count because it is against the aim of the research question. A different research question allows a unique set of answers that are not available under other research questions. Hence, some research questions would be more fruitful than others because they permit relevant answers that other questions do not. The second tool for assessing fruitfulness is discovery heuristics. A research programme is said to be fruitful if it employs *reliable* heuristics. Being reliable means generating well-designed

25 Ivani 2019, p7

and rigorous hypotheses that are free of faulty reasoning. Moreover, even if a formulated hypothesis turns out to be false, this does not mean the research heuristic is unreliable. As long as the hypotheses generated are testable and we have reason to assume they may be true, that is enough to determine a reliable heuristic is being utilized. Research heuristics that produce numerous testable and novel hypotheses are more reliable than those that produce less—but quality also matters. If a research heuristic is producing a large number of sloppy yet creative hypotheses, it would not be considered reliable. It is important to carefully think about the fruitfulness of discovery heuristics because sometimes it takes the generation of a large number of hypotheses (the majority of which may turn out to be false) to come up with the right one.

Ivani's original contribution to clarifying fruitfulness shall be beneficial whilst evaluating the competing frameworks under critique. I will argue Ivani's explication of fruitfulness as well as the tools she provides for assessing programme works in favour of MA. This is because it helps us to develop programmes better than the EF framework. Lloyd's reasoning for believing that EF is more fruitful than MA is twofold. Firstly, she thinks EF covers the functional answers MA provides and, secondly, that EF gives access to answers that are not allowed under MA. I am going to argue that the former is untrue and that the latter is insignificant and inconsequential when one looks at the overall benefits of MA. All said, these benefits are epistemic and non-epistemic. Below, I will cover the fruitfulness of MA and EF, which I shall execute via Ivani's definition.

Fruitfulness of MA and EF

In relation to research, MA asks "What is the function of this trait?" Due to the wording of the question, functional answers—that is, the trait has a function of x, y, z—are favoured. The

focus of this question is biological traits, so its aim is to discover for what function natural selection has shaped the trait. The orientation of the question makes it clear that the trait, from the starting point of enquiry, is an adaptation. As such, from the onset, MA practitioners discriminate against non-adaptive answers, and they see functional answers as mutually exclusive to non-adaptive ones. The rejection of functional answers is considered to be necessary before non-adaptive answers are allowed in—therefore, in doing so, adaptationists are treating non-functional explanations as statistical nulls. This is not to say that the MA framework never allows non-functional answers, it does, but only temporarily. For instance, Ernst Mayr writes that the adaptationist "must first attempt to explain biological phenomena and processes as the product of natural selection. Only after all attempts to do so have failed, is he justified in designating the unexplained residue tentatively as a product of chance."²⁶ There is an asymmetry here that is worth highlighting because, when a trait is labelled an adaptation, it is done so categorically, however, when a trait is labelled as a non-adaptation, it is only temporary. The discovery heuristics of MA—the strategies for developing novel hypothesis—are of two kinds: adaptive thinking and reverse engineering. Adaptive thinking is when scientists posit a specific adaptive problem in our evolutionary past and, subsequently, generate a hypothesis about the existence of a particular trait in order to solve that problem. After that, they then search for the said trait. Reverse engineering involves biologists studying a trait and working backwards to determine the particular types of functions that the trait would have potentially served for our ancestors. Both of these research heuristics produce adaptive hypotheses—that is, explanations of a trait in terms of selection pressures. However, Lloyd would claim these impoverish the quality of a well-designed hypothesis because there is a strong assumption of selective optimality. MA heuristics ignore or just give lip service to environmental constraints, developmental restrictions, and

²⁶ Mayr 1983, p326

byproducts. As such, some have argued that, by monopolizing the explanations, they are using unreliable heuristics.²⁷ However, others have claimed these heuristics are useful when studying some cases, but they perform poorly when studying others.²⁸ Still, others have argued that adaptationist heuristics may produce some sloppy hypotheses, but there is no reason to think they systematically do so.²⁹ Despite criticism, adaptationists continue to persevere. They highlight that MA is fruitful because it has accounted for previously unexplained phenomena and, also, it has solved novel problems. They would further add that it is not the case that they totally ignore constraints, for these are important in order to explain how new optimum peaks are reached³⁰—what is more, the idea of selection without constraints is meaningless.³¹ All said, the fruitfulness of MA is, in part, due to its understanding of how non-adaptive factors work within adaptive modelling.

Within evolutionary psychology, adaptationist thinking is championed as a productive and fruitful programme.³² MA has also been used in evolutionary medicine to help identify and cure diseases.³³ Indeed, MA is a very fruitful programme that generates novel hypotheses whilst stoking the creative imagination of scientists. Despite some criticism, the fruitfulness of MA is accepted by all—including Lloyd—so the question arises, *why would she want to replace something that is working?* While Lloyd agrees that MA is fruitful, she does not see EF as any less fruitful because it includes the benefits of adaptive answers. To that effect, she says, “But Methodological Adaptationism is so useful! Surely you are not advocating sacrificing our most fruitful research tool?! And no, I am not doing so, since the EF

27 Griffiths 2001 p309–325

28 Green 2014

29 Machery 2011, p232–246

30 Wade 2016

31 Rosenberg 2008, p75

32 Lewis 2017, Cosmides and Tooby 1994, Pinker 2002, Buss and Reeve 2003

33 Nesse and Stearns, 2008

framework includes the use of adaptation, and the search for connections to fitness or function, as a first ‘go to’ algorithm.”³⁴ Lloyd finds MA unsatisfactory because it focuses on function, so non-adaptive answers get left by the wayside. This is problematic because traits that are non-adaptive are either mislabelled or only tentatively accepted as non-adaptive.

Lloyd complains that this can make us miss the actual status of traits, which she thinks leads to scientific failure. Conversely, the EF question—“What Evolutionary Factors account for the form and distribution of this trait?”—would give functional answers a limited time before allowing non-adaptive answers to float in. For Lloyd, EF is the best of both worlds because it includes adaptive answers (although she puts them first, she says the order does not matter) and non-adaptive answers. She does not consider adaptive ones to be mutually exclusive to non-adaptive ones, but, rather, that many factors can be simultaneously invoked to explain a trait. The focus of the EF question is also biological traits, but its aim and orientation differ from the MA question. Its aim is to find out what factors account for a trait, and its orientation is pluralistic. As such, EF allows genetic linkage, phyletic inertia, pleiotropy, and other such non-adaptive answers. In terms of *prima facie*, having more answers on the list allows EF to seem more fruitful than MA as a research programme. Therefore, if Lloyd is correct about EF including adaptationist answers, it seems indisputable that EF has a significant advantage. While MA may desirably develop the content of programmes, EF also does so. Thus, EF would be better at developing, improving, amending, and extending novel hypotheses because there are more explanations for the creative imagination of scientists to explore. If this is the case, why do MA practitioners have so much confidence in it as opposed to EF? The reason seems to be in the background assumption of the MA research question. That is, scientists make the methodological assumption that focusing on functional answers has been the only trustworthy generator of novel hypotheses, so moving away from

such as practice would be detrimental. Mayr and others have vocally opposed EF on these very grounds. However, if Lloyd is correct, it means EF includes the package of functional answers that are associated with MA and, hence, this methodological assumption would turn out to be false. In short, EF would be more fruitful than MA and there would be no disputing it.

Logically, the next question one might ask is "What about the research heuristics that EF practitioners would employ?" This is a difficult question to answer because Lloyd and others have not provided precise heuristics of any sort. It may be a type of Bauplan thinking and reverse engineering, biologists could start by examining a trait and determining what developmental or environmental restrictions would have been in place to keep the trait from evolving in a different way. Alternatively, they could also imagine what type of constraints would have been prevalent in the evolutionary past, and then, from there, venture out to find them. Perhaps this is not what Lloyd has in mind, it may simply be the case that Lloyd allows adaptive thinking and reverse engineering, yet, has a stricter criteria regarding the detection of functional capacities and selective explanations. Either way, research heuristics under EF *prima facie* would be more fruitful than MA because it allows a vaster pool of explanations (adaptive and non-adaptive). To this, MA practitioners would reply that, they do allow

non-adaptive answers, MA is not committed to the idea that the biological world is saturated with adaptations. Instead, they merely begin with an assumption that the trait they are studying is an adaptation and that this starting heuristic is the best way to find the actual status of the trait. They start with the assumption that a trait has been optimally shaped by selection and deviation from this optimal can help us get an idea of where to look for other factors. As mentioned earlier, Lloyd would say this is merely hypothetical in practice because adaptive answers do not budge to allow non-adaptive explanations. In relation to that, I would

agree with Lloyd that adaptationists cannot adequately make the case that they, in practice, allow non-adaptive answers as alternative explanations. I think she is right about MA practitioners only seeing non-adaptive factors as fodder that merely fits within an adaptive explanation.

Thus far, it seems as if Lloyd's critique of MA is successful. That is, MA practitioners have a lack of a stopping rule for functional answers, they miss out when it comes to invoking

non-adaptive answers, they treat adaptive and non-adaptive as mutually exclusive, and they sometimes lose the ability to weigh evidence properly. Clearly, if we go by what we know so far, EF is more fruitful than MA. However, there is one crucial point that Lloyd is wrong about, and it is this that will give us the opening to directly challenge her framework. Lloyd claims that EF covers adaptationist answers and, also, even treats them as a priority. Although she is partially correct, EF does not cover *all* potential functional answers. Lloyd knows this is true and, what is more, she would not disagree because she not only speaks about a stopping rule for functional answers, but also writes against staunch persistent adaptive reasoning. Lloyd thinks a stoppage rule is harmless, but that is not true because it causes us to miss out on *some* adaptive answers, which is a significant problem. I believe the reason Lloyd thinks a stoppage rule is harmless is because she possesses a false methodological assumption that functions are easy to detect.

Lloyd challenges the persistent functional questions that MA practitioners revel in. However, it is precisely this type of tenacious adaptationist thinking that, despite a large number of initial failures, has led to functional discoveries. As Tim Lewens explains, "It is true, of course, that many traits turn out to have rather complex functions that a less persistent

biologist would never have noticed.”³⁵ The very reason Lloyd desires to replace MA is its endless stubborn adaptive reasoning—yet, in some cases, this does lead to the discovery of elusive adaptations. In fact, Lloyd explicitly challenges Mayr because he thinks that, even if we constantly fail to find functional answers, we “tentatively” label those traits as

non-functional. Lloyd dismisses this asymmetry because she does not want tentative labels for non-adaptive answers—instead, she desires them to be categorically accepted in a manner akin to adaptive traits. Because EF has the potential to miss out some functional answers, it is not true that it includes the benefits of MA. This is significant because it means MA can produce epistemic goods that are unavailable under the EF framework, so the idea that the latter is more fruitful because it includes both adaptive and non-adaptive answers is incorrect.

Although the EF approach denies the opportunity to bank hard-earned adaptationist discoveries, Lloyd could respond that MA risks denying some non-adaptive traits their actual status. Her prize horse, the female organism, would be a case in point. Now, it seems we are at a deadlock, because both camps claim there is a risk in each approach. However, to properly appraise the frameworks under critique, we also need to clarify the impact of each risk. Lloyd and Naomi Oreskes's recent work (2018) on anthropogenic climate change (ACC) would be a helpful place to start. They compared the two rival approaches (Risk-based and Storyline) to the detection and attribution (D&A) of the effect of ACC. Each approach had a different research question that Lloyd and Oreskes argued would lead to different risks. As the authors explain:

35 Lewens 2009, p170

Much of the discussion of risk-based approaches to D&A makes the claim, either explicitly or implicitly, that it would be wrong to overstate the contribution of ACC. Advocates for this approach are thus in effect arguing that a type I error (claiming something that is not the case or overstating an effect, also known as a false positive) is more serious than a type II error (missing something that is the case or understating an effect, also known as a false negative).³⁶

Similarly, in our case, the MA and EF framework leads to different risks. Determining which risk is more important would help us ascertain the merits of each approach. And so, the question arises: “More important in what way?” In terms of the detection and attribution of ACC, it is quite clear that the two approaches have a direct impact on society's concern with ACC. Therefore, in deciding what risk type is more damaging, we would be required to view it from a sociological perspective, which as the authors admit tells us that “there is no ‘right’ or ‘wrong’ approach to D&A in any absolute sense, but rather that in different contexts, society may have a greater or lesser concern with errors of a particular type. How we view the relative risk of overestimation versus underestimation of harm is context-dependent.”³⁷ In our case, it is not that simple. Lloyd would posit that our goal is to get a true picture of the biosphere as well as a clear understanding of the processes that generates traits. She could argue that MA overestimates the effect of natural selection and, therefore, risks misleading us about the true nature of traits. Although EF misses out on some functional answers—because of the fact that it as a framework includes functional and non-functional answers—it is less risky when it comes to providing us with a false status of traits. The risk of accepting MA may lead to non-adaptive traits being mislabelled as functional or provincially functional, which would be a type 1 error. Conversely, we have reason to assume that the EF approach

36 Lloyd & Oreskes 2018, p316

37 Lloyd Oreskes 2018, p321

may lead to cases of type 2 errors—that is, where selective effects are downplayed and traits are labelled as non-functional, which would be in spite of the fact that they are shaped by selection. Without delving any further into the risks of each framework, we now have one small victory against Lloyd's argument for replacing MA with EF. At the very least, we can say that Lloyd's claim to *categorically* replace MA has been blunted. Similar to her own stance on the rival approaches to D&A, there is no outright wrong or right framework because it is all context-dependent. Society's concerns largely dictate what risks are important and, therefore, what framework may be favoured. Lloyd must concede this point because it is clear—from her paper on ACC—that rival programmes are neither right nor wrong in an absolute sense, which means she needs to admit the same is true about EF and MA. If she does not, she would be inconsistent and would, thus, need to provide reasoning for why, in the case at hand, we have right and wrong approaches while, in ACC, we do not. Currently, it seems as if we have arrived at an impasse. Based upon what we know so far, both MA and EF have risks, so there is no clear winner. However, I think there is a clear way of showing how MA is superior to EF. In the next section, we shall examine cases of junk DNA and evolutionary medicine. I will show that the mislabelling of junk DNA was due to EF, and that only MA practitioners brought about its revision from “junk” to “functional”.

Also, I will show that the success of evolutionary medicine is due to adaptationist thinking. Both these cases have significant epistemic and non-epistemic consequences, so they will help us comprehend why MA is a more fruitful framework than EF.

Epistemic and Non-Epistemic Benefits of MA

Let us now consider the case of junk DNA. Biologists studying the genome found that large sections were doing nothing, and repeated attempts to find function came back empty. Only

1% of our DNA was found to code for proteins, so the remaining 99% was assumed to be meaningless *garbage* leftover after natural selection. Explaining this, biologist Wojciech Makalowski remarked, “For decades, scientists were puzzled by this phenomenon. With no obvious function, the noncoding portion of the genome was declared useless or sometimes called ‘selfish DNA,’ existing only for itself without contributing to an organism’s fitness.”³⁸ In 1972, geneticist Susumu Ohno named these non-functional DNA as junk. The label stuck and was eventually accepted by the majority of biologists. In essence, junk DNA was defined as having two unique properties: “(1) It arises when a DNA sequence spreads by forming additional copies of itself within the genome. (2) It makes no specific contribution to the phenotype.”³⁹ In the case of junk DNA, not only was there a failure to find function, but these noncoding regions were deemed detrimental to hold. In 1980, biologists Ford Doolittle and Carmen Sapienza wrote, “. . . there are two reasons to doubt that they arose or are maintained by selection pressures for such evolutionary functions. First, DNAs without immediate phenotypic benefit are of no immediate selective advantage to their possessor. Excess DNA should represent an energetic burden, and some of the activities of transposable elements are frankly destructive.”⁴⁰ Significantly, biologists were discouraged from questioning the label of junk, and even eminent scientists—such as Francis Crick—openly called out the folly of obsessively hunting for functions. However, a small group of biologists committed to staunch adaptationism persisted, and, ultimately, their struggle was not in vain. As Makalowski points out:

Although very catchy, the term “junk DNA” repelled mainstream researchers from studying noncoding genetic material for many years. After all, who would like

39 Orgel Crick 1980, p1

40 Doolittle & Sapienza, 1980, p602

to dig through genomic garbage? Thankfully, though, there are some *clochards* who, at the risk of being ridiculed, explore unpopular territories. And it is because of them that in the early 1990s, the view of junk DNA, especially repetitive elements, began to change.⁴¹

Junk DNA was still accepted by the majority of biologists until 2012. In that year, a landmark study by an international panel of scientists—published by the public research project ENCODE (Encyclopedia of DNA Elements)—had shown that the majority of the noncoding DNA was functional. Junk DNA was not actually junk—that is, it was found to be playing a crucial role in regulating the coding parts of the genome. What was previously thought to be meaningless rubbish had vital information for the understanding of many common diseases. Clarifying the implications of these findings, science writer Katherine Harmon says, “An international consortium of hundreds of scientists has now deciphered a large portion of the strange language of this junk DNA and found it to be not junk at all. Rather it contains important signals for regulating our genes, determining disease risk, height and many of the other complex aspects of human biology that make each one of us different.”⁴² It is not an exaggeration to say the revision of junk DNA opened up an epistemic treasure trove for biologists to explore. Indeed, there has been a paradigm shift in the way biologists now view noncoding DNA, which is far from meaningless rubbish because it is now considered valuable information that can radically improve our understanding. Since 2012, there has been a flurry of activities enhancing our understanding of genetics, inheritance, and diseases. Most recently (2019), a study found that noncoding elements play a critical role in biological

41Makalowski 2019

42 Harmon 2012

processes, and, therefore, knowing this “is necessary for understanding the underlying mechanisms of the diseases and to design effective treatments.”⁴³

Considering the abundance of the noncoding regions as well as the fact that non-functional answers are only temporarily accepted, MA reasoning would never categorically label these noncoding DNA elements as junk. Under a strict MA regime, the absence of evidence for function is never evidence for absence. As mentioned earlier, EF and MA are both live approaches that are used by biologists, and it is Lloyd’s aim to have biologists decisively drop the latter for the former. Acceptance of non-functional junk DNA is exactly what one would expect from an EF approach because, essentially, this framework gives functional answers a limited space for exploration before deciding that a trait has a non-adaptive status categorically instead of tentatively. Proponents of EF did not encourage the lone *clochards* to continue the struggle against the odds in order to revise the status of junk DNA. Rather, it was a stubborn and persistent faith in MA that led to this discovery. Everything that Lloyd suggests is wrong with MA—its lack of a stopping rule for functional answers, its privileging of adaptationism, its treatment of non-adaptive answers as nulls, and so on—turned out to be instrumental in the success of causing this revolution in genomics. According to the EF research question and discovery heuristics, Noncoding DNA would have been labeled as “junk” a long time ago (which it was), and there would be no room to redeem it of that status. EF practitioners have a serious problem to consider—that is, their reason for the rejection of MA was mislabelling of traits—yet that is exactly what they have done in this case, and it was far from inconsequential. At this point, in this discussion, we now have a clear epistemic reason to favour MA over EF. In short, MA has led to

a goldmine of pursuits for scientists to explore while, conversely, EF's labelling of junk was both a science stopper and a blockage

43 Noorul, Annette, & Chen 2019, p1

of progress in genomics. Lloyd may respond that the door swings both ways, EF can lead to mislabelling a functional trait as non-adaptive and this has epistemic consequences, but the vice versa is also true. MA may lead to non-functional traits being labelled as functional and this has epistemic consequences too. I disagree with the symmetry that Lloyd may try and draw. What epistemic benefits have we had from labelling a trait as non-functional? When a trait is found to be an adaptation there is a clear opening for further research as in the case above. When function is mentioned, 'design' has been found, this means design specifications are invoked, which means types of design problems need to be inferred, which leads to selective pressures to be invoked and so on. Conversely when a trait is labelled

non-functional it is a science stopper. What further research can be done if a trait is labelled as junk, a spandrel, a product of drift, phyletic inertia, developmental or environmental constraints? Nothing or not much. The buck stops right there, there is no further major leads to pursue, it's practically a dead end epistemically.

Lloyd has empirical and methodological assumptions behind her choice of EF. All told, she believes adaptations are ubiquitous and should be easy to spot, which is why she wants to give them limited time. As we have seen with the case of junk DNA, it is not true that functions can always be easily found. It took a long time—decades, in fact—to find functions for the DNA that was supposed to be junk. Lloyd's methodological assumption that adaptations are easy to spot is wrong. Also, because non-functional DNA was labelled as junk in the 1970s, no one bothered to go further and do a detailed evaluation for the cause of such junk—that is, determine which specific non-adaptive factors lead to this, what proportion of the junk is due to drift, what amount is due to duplication, and what is constrained due to the Bauplan of the genome. No one cared because there was no benefit to such superfluous history. However, if one considers the flurry of work that has been done

since we discovered the junk was not junk, there are further studies, more research funding, an increased incentive to expand our understanding, and an epistemic return on investment with functional traits that do not exist with non-functional ones.

Clearly, these new findings pertaining to DNA also have enormous implications for our

well-being. Non-epistemic consequences call for the introduction of non-epistemic values in science, and these should affect the choice of methodology. I will argue that the cost of having too many false negatives in relation to functional traits is a greater risk than having too many false positives. This is because adaptive traits can help us find novel and previously hidden information that is important for well-being. Conversely, I believe that labelling a trait non-functional does not have this level of instrumental worth. If this is correct, it means it is in our interest to privilege MA over the EF framework—that is, for both epistemic and

non-epistemic reasons. Privileging MA shall circumvent most of Lloyd's criticism of the programme.

There is an inductive risk involved in the process of labelling traits, and there are important non-epistemic consequences to these frameworks. Therefore, MA should not be replaced as the default framework. As mentioned earlier, research questions have background assumptions, and, of course, Lloyd would say that MA is

based upon a false methodological assumption—namely, that starting with adaptationism as an organising principle would reveal the true status of traits. If this is the assumption, I agree that it is false—but it is also a moot point. A better methodological assumption would be that, because adaptive traits have epistemic and non-epistemic benefits in a way that non-adaptive traits don't—we need to focus on the former and give little or no attention to the latter. What is more, we can invoke a moral background assumption because there are medical benefits to discovering functional

traits, and functional thinking (like in the case above) helps us to develop medicines, understand diseases, and comprehend inheritance. By contrast, discovering non-functional traits means nothing, medically, except a null result with no tangible benefits. Therefore, we have a moral duty to privilege the system that gives us medical benefits because the very reason we do science is for human well-being—that is, regardless of the risk of mislabeling of traits (false positives). This moral assumption is rather sensible because scientists are personally driven by a desire for human well-being, and, also, science research is granted based on multiple criteria, one of which is the practical benefits of projects. ENCODE is a case in point because although as a project it cost \$400 million, the revision of junk DNA has given us promising potential avenues to radically improve human well-being. If this was not the case, the money would be unjustified. In fact consider if rather than revising the status of junk DNA, ENCODE instead reconfirmed it and we were given a detailed history of each non-adaptive factor as well as what role it played in leading to the garbage island that this noncoding region was supposed to be, there would be no public or scientific interest in knowing such trivial information. It would have been seen as an utter waste of time, money, and expertise. Indeed, scientists would not have been so keen to publish or even do research if ENCODE was a project to uncover the genomic mysteries of, say, anteaters! The very reason it is of importance and the public is willing to fund it—and scientists willing to labour—is the fact that this is about humanity and it's well-being.

Another concrete example of the benefits of MA is the field of evolutionary medicine (also known as Darwinian medicine). Evolutionary medicine is the application of evolutionary biology to solve issues in medicine. Adaptationists wanted medicine to be integrated with evolutionary biology, so they came together to develop this field. It is important to highlight that it has only been since the 1990s that this field officially came into being. Before then,

medicine was largely independent of evolutionary thinking. At the forefront of this movement was Mayr, for he desired adaptationism to be centre stage in this new field. It is clear that evolutionary medicine—as it is practised today—is still based upon staunch MA. In a recent paper, Randolph Nesse and Stephen Stearns write, “At the core of evolutionary medicine is recognition that diseases need both proximate explanations of bodily mechanisms and evolutionary explanations of why natural selection has left the body vulnerable to disease.”⁴⁴ Recently, there was a meticulous study that sought to “systematically elicit core principles from a diverse panel of experts in evolutionary medicine,”⁴⁵ which found that, among practitioners of evolutionary medicine, 86.5% identified natural selection as a core principle that has “shaped all aspects of our biology, and results in adaptations.”⁴⁶ And so, there is no doubt that evolutionary medicine—as it is currently practised—is based upon an MA framework instead of an EF one. Therefore, the successes of evolutionary medicine is due to MA. Indeed, by giving us new perspectives on diseases, cures and prevention, MA has directly benefited us. What is more, recent publications by proponents of evolutionary medicine highlight how adaptive accounts have been instrumental in understanding vulnerability to diseases, nutrition and development, miscarriage, cancer, auto-immune problems, mental disorders, and so on. Its practitioners argue that its success is due to its capacity to posit new research questions and to give us an integrated framework to synthesise medical knowledge with evolutionary history. In relation to this, Nesse points out five benefits of applying evolutionary thinking to medicine:

1. Expanding evolution's contribution to existing research enterprises that rely on it (e.g., genetics, infectious disease, and research on aging).
44 Nesse & Stearns 2007, p3045 Grunspan 2018, p146 Ibid
2. Providing a theoretical foundation for epidemiology and public health.
3. Heuristic value: formulating new questions about disease that motivate new studies.
4. Unifying research from different disciplines.
5. Providing a framework for understanding disease from the perspective of evolutionary as well as proximate biology.⁴⁷

Regarding each of these areas, Nesse goes into quite a bit of detail, with examples of successes and, also, potential avenues for future findings that would have medical benefits. As an example, here is a research question that evolutionary medicine could pose: "Why has natural selection left this species vulnerable to diseases?"⁴⁸ According to Nesse, the potential answers can be put into six broad categories:

Natural selection is slow

1. Mismatch: Our bodies were shaped for environments far different from those we live in, and the mismatch gives rise to much disease.
2. Co-evolution with fast evolving pathogens: Because their generation times are so much shorter, pathogens evolve much faster than we can, so evolution cannot provide perfect protection against infection. There are limits to what selection can shape
3. Constraints: There is much that selection simply cannot do, such as starting a design from scratch to fix a design defect such as the vessels in the eyeball running between the light and the retina, or creating a gene replication method that never makes mistakes.
4. Trade-offs: Inevitable trade-offs make every trait suboptimal; for instance, if our vision was as acute as that of the eagle, our color vision and field of vision would be worse.⁴⁷ Nesse 2007, p42448 Nesse 2007, p422
5. Reproduction at the expense of health: Natural selection increases the frequency of genes that yield a net increase in reproduction even if they compromise health and longevity.
6. Defences: Defences such as pain, fever, nausea, vomiting, and fatigue are not problems, but useful responses shaped by natural selection.⁴⁹

Certainly, there is a great epistemic leap with the new research questions that evolutionary medicine allows, and this, obviously, has tangible medical benefits. We have almost 30 years of evidence to show the instrumental value of adaptationism in medicine. Moreover, the success of evolutionary medicine has been acknowledged and well-documented by experts from various medical fields.⁵⁰ And yet, how has the EF framework lead to medical benefits? It has not, and there is no literature to show that it has. Acknowledging non-adaptive factors in evolution (except within an MA framework) may have added to our understanding of the biosphere, but it has failed to directly benefit us in a practical sense. A pluralistic account such as EF would have hidden some useful relationships and avenues for medical research. This is because EF does not grant the adaptive answers MA does, and it is these very elusive adaptive explanations that can have significant consequences for our well-being. If evolutionary medicine was based on an EF framework, would it have the success that we have today? If one wants to argue that it can be just as successful, they would, at best, give us hypothetical scenarios of how acknowledging non-adaptive factors would aid the development of medicines. Of course, it is possible to run an evolutionary medicine programme under an EF framework, and only then will it be clear whether or not it is better than the way it is practised today. Currently, there is no empirical evidence for that claim.

Evolutionary medicine does acknowledge a range of non-adaptive factors, but it does so,

⁴⁹ Nesse 2007, p423

⁵⁰ Stearns 2015; Gluckman 2016

strictly, within an MA framework—that is, in the exact way Mayr recommended. Adaptations are assumed to be optimal and, when it is found that a trait is suboptimal, non-adaptive factors are invoked to explain this divergence.

Because MA has already provided us with enormous medical benefits, and because it has the potential to do a lot more, it would be a moral duty to accept, endorse, and practice it.

Therefore, the moral assumption is well-founded. We should favor MA for the non-epistemic benefits it grants us. In addition to the moral, the methodological background assumption makes us choose the MA framework to be more fruitful. Having said that, the moral assumption has more weight than the methodological one, the reason why is that the latter is about the epistemic goods that can be gifted via a trait being labelled functional—while the moral assumption carries with it life changing implications. Imagine if, 40 years ago, we discovered that junk wasn't actually junk. On the surface, it seems unlikely that we would have been able to make this discovery, however, if we imagine that the entire biological community was committed to hard-nosed adaptationism, it does not seem so far-fetched.

Indeed, it was not technological limitations that stopped biologists from looking for functions, it was the belief that noncoding DNA is non-functional. If we had, decades earlier, discovered what ENCODE did in 2012, we would, by now, have advanced significantly in our understanding of diseases, which, of course, would have directly impacted our

well-being. Missing out on traits that are non-adaptive is not as important as mislabeling adaptive traits as non-adaptive. That is, the risk of underestimating natural selection is greater than overestimating it. And so, the moral assumption gives us decisive reason to privilege MA over EF. What is more, the benefits of MA allow us to circumvent Lloyd's criticism. Her problems with MA—its lack of stopping rule, mutually exclusive treatment of adaptive and non-adaptive answers, and treating non-functional alternatives as nulls—turn out to be a

virtue rather than a vice because there is epistemic and non-epistemic reasons to privilege MA, which is why it is a more fruitful as a system and should not be replaced.

Conclusion

Lloyd has strongly critiqued MA and desires to replace it with the EF framework. She believes it is more fruitful than MA because it has more answers available, and, also, that EF includes adaptationist explanations as a first-go to algorithm. I have argued against this because EF misses out on some adaptationist answers. Likewise, under MA, non-adaptive answers are missed out. Although there is a risk of overestimating functional answers in MA and underestimation in EF, I have argued that this does not lead to a deadlock because we have reasons to assume adaptive answers are more important than pluralistic answers. The reasoning behind this is the fact that adaptive answers have epistemic and non-epistemic benefits that non-adaptive ones don't. To that regard, I used the example of junk DNA and evolutionary medicine to illustrate this asymmetry. In knowing this, we must privilege adaptive answers because they are more fruitful. Indeed, doing so would dampen Lloyd's criticism of MA, for what she thinks is a disadvantage works out, instead, to be an advantage. Therefore, Lloyd's argument to replace MA with EF does not work.

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Do Scientific Theories Give Us the Literal Truth, or Are They Merely Useful Instruments for Making Predictions?

Introduction

Science works. When one makes a prediction using a well established scientific theory it gets confirmed by observation. A scientific theory can be labelled successful “if it makes substantially correct predictions, if it leads to efficacious interventions in the natural order, if it passes a battery of standard tests”¹. So why are theories so successful? Realists explain the success of theories by

their truth. They believe science is actually describing the way the world actually is, the unobservable entities and structures that a theory posits are truly describing the actual state of affairs. Hilary Putnam argues that the success of science would be a miracle if it was not describing the way the world actually is². Against the view that Science is giving us a true picture

of the unobservable world is that of selectionism³. Selectionists believe science doesn't gift us

truth, rather theories are useful instruments for making predictions. They don't agree that the success of science compels us to become realists. Rather they see the scientific environment as one in which theories are involved in an evolutionary struggle, where predictively successful theories survive while others are eliminated.

Selectionists accept what science says about observables but remain agnostic about the unobservable structure, entities and processes. Bas Van Fraassen popularised this view and Bray Wray has developed and defended it⁴. Wray argues

¹ Laudan, 1981, p23

² Putnam, 1975

³ Wray, 2007, p81-89

⁴ Wray, 2010

that selectionism explains the phenomena of competitions between scientific theories and past failed theories, while realism does not, therefore selectionism is the better position to hold.

Seungbae Park responds to Wray by arguing that realists have subscribed to *approximate truth*

not literal truth in their charter and this can accommodate failed theories and competitions⁵. In

this essay I will argue that selectionism is the correct position because it explains more phenomena in science than realism. I will show that Park's realist explanation doesn't work because it overplays approximate truth and he thereby fails to undermine Wray's argument for the superiority of selectionism. Additionally I will attempt to strengthen the case for selectionism by highlighting another phenomenon present in the scientific environment, constraints.

Constraints in science like those operative in the biological sphere restrict which options selection can work on, as such they can lead science away from true theories. Three such constraints I will highlight are coherence with other theories, unconceived theories and entities, and conservatism. These restrict the theory options that are available to scientists, so a theory that may be approximately true may never come to surface. If this is right then this means a predictively successful theory may be approximately true or may just be the best of a bad lot.

Constraints are a serious challenge to realists, and they seem to have no good answer available to them. I conclude that realism can't shelter competitions, failures and the tapestry of constraints present in the scientific environment. Selectionism better accounts for these phenomena and therefore it is the correct position to hold.

5 Park, 2014

Failed Theories and Competitions

Wray argues for the superiority of selectionism's explanatory power over realism for competitions between scientific theories and past failed theories. He considers the widely accepted theories that are no longer thought to be true to be a thorn for realists. Before the time that a successful theory was discarded, Wray says the realist would have had no choice but to call it true. Since it was discarded it puts the realist in a precarious situation. They will have to strip it of a realist truth stamp and will have to say that a theory that once described the unobservable structure and entities of the world no longer does. He points to studies of Larry Laudén⁶ and

Martin Carrier on the predictive success of failed theories. Predictive power is not sufficient to entail truth as some past theories such as phlogiston theory, caloric theory of heat, and Newtonian mechanics were predictively successful yet turned out to have false ontologies. Even in cases where novel accurate predictions were confirmed, the underlying theory that these were derived from turned out to have misrepresented the structure of the world. Carrier explains that there are some theories 'in which wrong aspects of wrong theories are responsible for [novel]

predictive success⁷'. Wray thinks the history of science gifts anti-realists permission to unlink

the predictive success of a theory and its supposed truth, and this is a major problem for realism. On the other hand, selectionists aren't bothered by this phenomenon, as they can explain failed theories as a consequence of new developments within the scientific fields. As a field develops, pressures increase on theories to produce better results, make more predictions, and explain novel phenomena. Some theories can withstand these new challenges while others fail to succeed

6 Laudén, 1981

7 Carrier, 1991

and are eventually rejected. Selectionists have an answer that is not available to realists. Wray also highlights scientific competitions as a problem for realism. Two predictably successful theories can be present at the same time. Wray cites the 16th century competition between Copernican and Ptolemaic theory of planetary motion. Both were at the time on par in terms of their predictive power yet made incompatible and radically different claims about the actual picture of the world. Wray argues that realists can't claim that two prevailing theories are giving us true descriptions of the world, as they make quite different and conflicting claims about the actual underlying structure, entities, and processes. Again selectionism doesn't have a problem with this. Indeed it's compatible with selectionism to have two predictively successful which scientists would subscribe to. Selectionists are agnostic about the unobservables so they don't have to accept that any one of the successful competing theories is actually telling us the actual state of the world. Wray concludes that selectionism better accounts for both competitions and failed theories than realism.

Park challenges Wray's argument that realism fails to explain competitions and failed theories. He concedes Wray's point that predictive success alone does not entail truth. He argues that the realist only has to make a link between predictive success and approximate truth, not the literal truth of a theory. He sets out to show that increasing predictive success is a reliable indicator of being closer to the truth. To see this he asks us to consider an analogy: "... suppose that one hundred people are located in Los Angeles. All of them take a step toward the White House, but none of them arrives in the White House. Thus, taking a step toward the White House is not a reliable indicator of being in the White House. Even so, taking a step toward the White House is

a reliable indicator of being closer to the White House."⁸ Park thinks the realist can admit that

the formerly successful theories which are now rejected are not literally true. Even so, he claims this does not rule out the possibility that the rejected theories were more approximately true than their forerunners. Turning Wray's example against his position, Park says the Copernican and Ptolemaic theories are a case in point, the latter was less approximately true than the former.

Wray wouldn't disagree that Copernican theory is more successful and more truer than the Ptolemaic theory. So Park thinks Wray then also has to concede that *increasing* predictive success is a *reliable* indicator of being *closer* to a true theory. This he believes is enough to show that realism can account for failed theories. On the point about competing theories Park makes a very brief response. He thinks Wray has mischaracterized what a realist would say about scientific competitions and misses the leverage *approximate truth* grants: "No realist would say that the Ptolemaic theory and the Copernican theory coexisted because these theories accurately represent the underlying structure of the world. Rather a realist would say that they coexisted because both theories *approximately* represent the underlying structure of the world, and neither theory was revealed to be closer to the truth than the other."⁹ Park believes a realist can accept

two competing theories as approximately true and over time the one that is closer to the truth will

reveal itself to be more predictively successful than the other. So competitions for Park aren't an issue for realism as Wray wants to portray. Park concludes that selectionism doesn't have the upper hand in explanations, rather Wray simply misreads the capacity of the realist responses. He concludes that realism explains both phenomena adequately.

⁸ Park, 2014, p.7

⁹ Park, 2014, p.7

Misusing Approximate Truth

Park has overplayed the term *approximate truth*. He is right when he says taking one step towards the White House justifies one's inference that they are *closer* to the White House than before. However, this does not justify the belief that they are in the White House as approximately true. Even if someone has left Los Angeles and has covered 40% to 60% of the distance to the White House, we can't say that they are approximately in the White House. Even if a more predictively successful theory is a reliable indicator of moving closer to truth, we can't know if our current theories are approximately true as we have no idea how far off the mark our theories are from the actual state of affairs. It is necessary to know the true structure of the world before we know the perimeter which allows us to start using the label *approximate truth* for theories appropriately. In the case of the White House we know its exact location, and we can set a precise distance at which we can start saying a person is approximately in or near the White House. With scientific theories, however, we don't have that privilege. We may have successful scientific theories that actually are approximately true, however, we wouldn't be able to differentiate these from other successful theories that are truer than their predecessors, but very far from being justifiably labeled as approximately true. Park may object that his analogy was not meant to justify us labelling our current best theories as approximately true, only that *increasing* predictive success is a reliable indicator of being *closer*, albeit incrementally, towards truth. If that is the case then his analogy can only support the view that a failed theory which was superseded was less true than the one that replaced it, nothing more. Thus he hasn't really achieved much by way of this analogy in explaining failed successful theories.

On the issue of scientific competitions Park doesn't say much. He thinks that theories coexist because "both theories *approximately* represent the underlying structure of the world"¹⁰. I don't

think this answer puts the realist in a good position, because if Park was around in the 16th century when Copernican and Ptolemaic theories were pretty much on par in terms of their predictive success he would have to label both of them as approximately true. This is quite absurd, in what sense can Copernican heliocentrism be on on par in terms of approximate truth with Ptolemaic geocentrism? What does *approximate* even mean if it can be stamped on one claim about the underlying structure and another totally distinct one? Park's use of approximate truth for competing successful theories doesn't work either. His use of approximate truth is imprecise and does not motivate his account for explaining the phenomena of competitions and failed theories. Additionally there is a third phenomenon present in the scientific environment which is hard to explain for the realist, constraints.

Tapestry of Constraints

Selection in nature operates on live options that are available, these options are limited by constraints. When studying a biological trait we may be tempted to think that it is perfectly fit for the environment, however there are constraints that are tangential to its ideal adaptive form such as drift, embryonic restraints, unbreakable genetic linkages, phyletic history, bauplan, and developmental factors. Likewise even a successful theory is chosen amongst options which are

¹⁰ Park, 2014, p.7

limited by constraints such as coherence with other theories, unconceived theories and entities, and conservatism. These constraints are interwoven and amplify each other so it's fit to label them as a tapestry of constraints. The realist has to assume that theory options are unrestricted, that we can come up with a full range of theories ranging from ones that can hardly be called approximately true to others that are very close to truth.

Since the theories that are close to the truth will be more predictively successful than others, these will become accepted while the others are rejected. The existence of this tapestry challenges the assumption that scientists have conceptual access to a complete spectrum of live theory options. Constraints may well keep the predictively supreme theories unavailable, unconvinced and buried deep within the web of theories. Therefore scientists are less likely to choose theories that may be the most predictively successful because these may never come within their purview.

Web of Theories

Firstly theories are constrained by other theories. A theory is not tested on its own; rather it is expected to fit within a coherent holistic web of theories. This interlinked web is hard to untangle and theories rely on each other for direct input of variables. Such relationships can sometimes be tangential to the true state of affairs that the theory is trying to unveil. In the early part of the 20th century such a tension was revealed. For Darwin's theory to work it needed hundreds of millions of years. To his dismay the renowned physicist William Thomson had worked out the age of the earth to be ten times lower than what was sufficient. Obviously this was a cause of Darwin's 'sorest troubles', since the best physics of the day conflicted with evolution by natural selection there was good reason to doubt it. Eventually the standard view was revised and sufficient time

for Darwinian selectionism to work was granted¹¹. If the standard view hadn't been revised

natural selection may not have become the dominant theory to explain biodiversity. Even

hard-nosed realists would admit every individual theory, no matter its success, is prone to some error. This is why they prefer approximately true rather than literally true when they seek to describe the unobservable posits of a theory. The issue is that since each theory is sitting within a web of other error prone theories, the risk of error is compounded. Takeaway lesson from this is that theories are constrained by the developments of other theories and this can be an important factor in their acceptance. The formulation of new theories and success of existing theories is restricted by the development of other theories. Realists don't have a way of mitigating this constraint. They can't deny theories are interdependent or that each theory is error prone. They will simply have to *accept* this limitation. The realist may argue that although a theory may be limited within a web of theories, as a whole this web moves closer to the truth. This is a fair point, however there are limitations which can make progress more interdependent and sluggish. Scientists from different fields would have to sit together in interdisciplinary committees and resolve conflicts in theories. Even if such rare opportunities arose, this is hardly going to be straightforward as scientists don't have in-depth knowledge of the nuances from other fields. A web of theories that is supposedly moving towards truth is further hindered by unconceived theories and entities.

¹¹ Lindley, 2004, pp 164-214.

Unconceived Theories and Entities

Kyle Stanford points out that in the history of science there were alternatives to our best theories which were unconceived at the time¹². Once these conceptually elusive theories became available

they were more predictively successful than previous ones. Einsteinian relativity is a prime example of this. The Newtonian paradigm, despite its enormous success, couldn't explain some anomalous data. This data could have easily been explained by relativity but it wasn't as the theory was unconceived of at the time. Stanford

thinks this gives us reason to believe that our current best theories might have unconceived alternatives. Darrell Rowbottom has developed this argument significantly to include unconceived “entities of different types: observations, models, predictions, explanations, methods, instruments, experiments, and values”¹³. Since each theory

sits in a web of interdependent theories, and there may be unconceived theories and entities within the web, we have a powerful recipe for constraining the potential alternative theories that can be live options for scientists to select from. Since our theory options are constrained, theories that may be approximately true, and may be the most predictively successful are less likely to see the light of day. Therefore our most successful theories today may be the best of a bad lot.

Successful theories are selected from amongst a set of theories that have been conceived. However we don't know the full potential set of theories as many may be unconceived. How would the realists know that from the set of conceived theories there are some that are approximately true? They wouldn't have any way of figuring that out. If the realist is right and predictive success is linked to being closer to the truth then unconceived alternatives can take us off track from finding more predictively successful theories and hence further away from truth.

12 Stanford, 2006

13 Rowbottom, 2016, p.1

At best the realist can claim our most successful theories are closer to truth than their alternatives and as science progresses we can keep uncovering these unconceived theories and can therefore move closer to truth. This however is tacitly accepting defeat as they can't say now that our best theories are approximately true and they also can't say how many unconceived alternatives are out there. So they wouldn't be able to label theories as approximately true even if there were long periods of progress and paradigm shifts. What makes this concoction of unconceived theories and entities, and the interdependence of theories worse is the increasing intellectual and theoretical conservatism in science.

Conservatism in Science

For some time science commentators have expressed worry about conservatism brought about by 'Big Science'. Historically science was done by 'gentlemanly specialists' who had free time, were self-funded, free of formal peer review and pressures of other scientists. They could research what they wanted, the way they wanted, without restriction. These free spirits produced paradigm shifting novel ideas and theories. From the mid 19th century onwards they were becoming increasingly rare and science started to be populated with trained specialists. States, private companies, and universities came forward to fund scientists for their own interests.

Scientists started to take wages for their scientific research, and had to conform to peer review and take into consideration the views of a large numbers of other scientists. All these changes “have served to reduce not only the incentives but also the freedom scientists have to pursue research that challenges existing theoretical orthodoxy or seeks to develop fundamental

theoretical innovation.”¹⁴ Finding novel unorthodox unconceived answers risks doing useless

research in uncharted territories. There is more incentive for scientists to stay safe and fit the parameters of their research in a way that is conducive to securing grants and the approval of the institutions that employ them. Professionalization of modern science has made it more conservative, less innovative, and more prone to the problem of unconceived alternatives than the science practised by the early gentlemen.

The amalgamation of the three intertwined constraints above means that realism is less likely to be true. This is due to that fact that we have constraints that restrict the live theory options that scientists can work with. Realists rely on predictive success to invoke truth yet predictively superior theories may be buried by the tapestry of constraints. So our most predictably successful theories may be significantly inferior to other theories that we have no idea exist. Even if increasing success is a reliable indicator of being closer to the truth we may be well off the mark even with our best theories. With these constraints in mind realists would have to hope that our current best theories *just* happen to be those that are approximately true. Indeed it would be miracle if this was the case! On the other hand the selectionist would have no problem in explaining these constraints. Selectionism holds that from a range of theories that are available, those that are most predictively successful survive while others are eliminated. A tapestry of constraints simply restricts the number of live theory options that available to scientists. So our most successful theories are only selected amongst those that have been conceived, there may be much more predictably superior theories buried within the pile of unconceived theories. So we

14 Stanford, 2015, p.3

have good reason to be agnostic about unobservables because we don't know if a theory that may be correctly labeled as 'approximately true' has been conceived. Selectionism is hence better suited to accommodate a tapestry of constraints.

Concluding Remarks

Selectionists claim the success of science needn't be linked to truth, rather it can be explained as a Darwinian struggle between scientific theories. Wray has defended this view by arguing that the selectionist view is better than realism as it explains competitions and failed theories in science. Park challenges this account; he argues that realism can account for both of these adequately. I have shown that Park's use of approximate truth is not sufficient to explain failed theories and competitions. Moreover, I have supplemented Wray's account by highlighting a third phenomenon, a tapestry of constraints. Theories sitting with a holistic web coupled with unconceived theories and entities, and theoretical conservatism blend well to reduce the number of live theory options that are available to scientists. This causes the probability of having access to a full range of theories of which some can be correctly described as approximately true to be lowered. Selectionism sits better with competitions, failed theories, and the tapestry of constraints than realism, therefore it is the correct position to hold. We are justified to be agnostic about unobservables, scientific theories are useful instruments for making predictions, nothing more. Theories work but they do not give us truth.

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Can Evolutionary Theory Can Explain in Purely Natural Terms Why We Have the Moral Beliefs That We Do?

I am going to argue that evolutionary theory can explain morality in natural terms and this motivates the anti realist position. In particular I will be focusing on Richard Joyce's argument from genealogical debunking. Russ Shafer-Landau has objected to Joyce and has put forth

contentions. I will address these and argue that Joyce's overall argument looks healthy. Realism will be defined as the position that ethical sentences express propositions, some of these are true and they achieve this status by reference to the objective features of the world. Anti realism will be defined as the view that moral properties do not exist. Although these rather broad definitions won't satisfy everyone they are sufficient for the purpose of this discussion.

Genealogical debunking

Suppose you lived most your life with the belief that your great grandfather fought in World War one. Your belief was not due to his war diaries, pictures or medals rather it was that your father who told you so, apart from that no one else mentioned this in your family. Your father is an honest man and so you have good reason to trust him. You then discover later on in life that your father suffers from a psychological condition in which he confuses dreams and reality. Your

mother informs you that your father knows nothing about your Great grandfather and that he saw a dream of him fighting in WW1 and hence he told you. Now where do you stand in terms of the epistemic status of your belief, do you still believe it? You can't say the belief is false as it may be true, on the very least you are unjustified in holding that belief, so you should really be

agnostic about it. You can decide to get to the bottom of this belief by going through your family records speaking to extended family members, maybe even enlisting a private detective, until you find sufficient evidence to conclude that he did participate in the war. Or you may end up in a situation where you do not have definite proof either way but end with some probabilities. The upshot is that your belief is undermined until you can find independent data to test it against.

Such a genealogical critique can be applied to our moral beliefs too. Think of the dream/reality confusion as the process of evolution and the beliefs produced as our moral imperatives.

Suppose the genealogy of the belief 'stealing from orphans is wrong' is only explicated in terms of a fitness advantage that our ancestors gained in the Palaeolithic era. A purely natural

explanation will not include moral properties that are mind independent. Anti Realists contend that our minds did not evolve to track truths from a moral realm. Rather they are just a useful collective fiction. Joyce uses the example of a belief pill which causes one to believe that

Napoleon won the battle of Waterloo. Once the subject knows that he has taken such a pill, his belief about the outcome of the battle should be considered unjustified. Joyce argues that this means that morality itself is undermined epistemically. Joyce's argument does not disprove the ontological basis for Moral realism rather it just makes it inaccessible to us epistemically.

Although a non moral genealogy and the existence of moral truths both may explain a moral belief, Occam's razor would shave off moral truths as a superfluous explanation. Evolutionary

forces have shaped our cognitive capabilities, however as such these capabilities are still reliable, they help us discover truths in logic, biology, history and so on. We have no reason to doubt the beliefs we hold in those fields but that is not the case with beliefs about morality. That is because if moral truths had been different our moral beliefs would have been the same. Although Joyce does not formalize his argument in the following way, I think this does capture what he has in mind:

J1. Moral truths may explain our moral beliefs and faculties J2. Evolution can explain our moral beliefs and faculties

J3. Moral beliefs and faculties are explained in a simpler way by evolution than by reference to moral truths

J4. The process of evolution is blind to moral truths

J5. Our moral beliefs and faculties can be explained by an evolutionary process that is indifferent to moral truths

Therefore

J6 We are unjustified to hold moral beliefs J7 Moral Realism is unjustified

It looks like this is an insurmountable challenge for realists to address. There have been some replies to Joyce which he has addressed, however the more recent criticism of Shafer-Landau has not had a response so that's what I am aiming to do below on Joyce's behalf.

Skeptical Worries

Firstly Shafer-Landau thinks that there are two distinct types of debunking arguments,

Knowledge based debunking and agnostic genealogical critiques. The former is when you show some claim to be probably false by showing it originated in a way that would have a severe distorting effect, for instance, the belief that a partially deaf person is very unlikely to note an

hour long speech accurately is true, we do not need to compare this person's notes with the actual speech to know that, of course we can do that if we so wished. Shafer-Landau thinks Joyce is not making this sort of argument as it is self defeating. This is because if such an argument would be deployed then it would have to show that evolutionary pressures have produced moral beliefs that we know to be false, if that is the case, then we would have used some base moral truths to make that judgment, thus we can use those base truths to judge any other moral belief that is produced under selection.

Shafer-Landau thinks the only possible argument that can be used is where there is no

assumption about where the truth lies. Suppose that someone makes the claim that yellow was the favorite colour of Genghis Khan when he was seven years old, when questioned how they know that they say that this is the colour of the last two cars that they saw. Even in our ignorance about the favourite colour of Genghis Khan when he was seven we can still comfortably say that this belief is unjustified as it was formed by a process which was not sensitive to the fact it purports to explain. Shafer-Landau thinks Joyce is using this type of agnostic genealogical

critique and that his argument consists of the following two conditions and only if these were true would it be sound. (1) to the extent that our moral beliefs are the product of evolutionary

forces, such beliefs are formed in ways that are insensitive to whatever moral truth there may be; and (2) our inability to exclude the possibility of insensitive doxastic origins for a set of beliefs S mandates suspension of judgment regarding all beliefs within that set.¹

According to this Joyce is not trying to undermine morality by showing a high likelihood that our moral beliefs are insensitive to the truth, what he is doing is claiming the mere understanding that we cannot discount the possibility that our individual moral beliefs may have insensitive origins undermines our justification in them.

So we are unable to disprove the possibility that our parents are not actually our biological parents but foster carers who happened to look similar to us, does that mean we should be skeptical about our lineage? Ofcourse not. This type of thinking when applied to

history, science, geography or any other facet of human knowledge would render those beliefs unjustified too as there is always a possibility that there is a wicked neuroscientist that has our brains in a vat and is manipulating our thoughts and feelings. This is the worry of Shafer-Landau and if he is right then Joyce's argument is on shaky ground, as no one would accept those

skeptical consequences.

So why does he think (2) is important? 'I think that Joyce's argument really does rest on (2), as he is appropriately modest about the nature and extent of evolutionary influences on our moral faculties.'²

I don't see what he means by 'modest' but if he has understood this to mean that Joyce thinks it's evolution can't be ruled out as an explanation of moral beliefs then he has misunderstood him.

Joyce spends considerable time in laying out the explanatory power of evolution and how even

moral beliefs that don't seem at first pass to be products of natural selection are in fact explained by it.

I think Shafer-Landau has misunderstood Joyce here, he is right about (1) but not (2). It is not our inability to exclude the possibility of insensitive doxastic origins for a set of beliefs that renders them unjustified. Rather it is the fact that we have good grounds for preferring the

evolutionary explanation over one on which our moral belief forming mechanism is sensitive to moral reality.

To see this suppose Joyce and Shafer-Landau were having this discussion before Darwin was born, Joyce's argument or any genealogical critique really might have to rest on (2). After

Darwin that is not the case, we have an understanding of a naturalistic process that is doxastically insensitive, we can't discount that such an understanding may be wrong and a

sensitive doxastic origin may be correct, but it does not follow that we should be skeptical about the conclusions of the doxastically insensitive origin account, as that is what we have.

To tease out the problem with Shafer-Landau view, let's accept his understanding of Joyce's argument and replace morality with religion:

1. to the extent that our religious beliefs are the product of evolutionary forces, such beliefs are formed in ways that are insensitive to whatever religious truth there may be; and (2) our inability to exclude the possibility of insensitive doxastic origins for a set of beliefs S mandates suspension of judgment regarding all beliefs within that set. If Shafer-Landau wants us to reject Joyce's genealogical critique of morality then he should also expect us to reject the genealogical critique of religion. It would be inconsistent to not do so, here Shafer-Landau may respond that the argument above is incorrectly constructed as it's not our inability to exclude the possibility of sensitive doxastic origins of religious truth that makes religious belief unjustified rather it is that the mere possibility of a religiously sensitive doxastic origin for a set of beliefs does not make them justified. Shafer-Landau skeptical worries would be legitimate if his understanding of Joyce was right, however he has misunderstood him and therefore his argument is misplaced. Now Shafer-Landau turns to the idea that even if Joyce's argument or any other anti realist didn't try and motivate moral skepticism by relying on the argument that it is impossible to rule out an insensitive origin of our moral beliefs and instead tried the more ambitious claim that it is highly likely that our moral beliefs are the result of evolutionary pressures, this is what he thinks will warrant moral skepticism. Shafer-Landau thinks he can undermine this claim too by using what he calls the 'Natural Reply'

The Natural Reply

Shafer-Landau thinks for the anti realist argument to work there must be a means of discerning between 'the real origins of our moral faculties from mere pretenders'. He thinks such a means can help realists with a way of working out the boundaries of an evolutionary influence. Realists should be able to use this to locate moral beliefs that are immune from evolutionary pressures, such beliefs can then be used as benchmarks to help sift through moral beliefs that resulted from evolution. These moral beliefs should meet three conditions:

1. They are immune from evolutionary influence;
2. We can know which beliefs those are, and
3. Such beliefs are highly presumptively warranted.

Armed with these beliefs he then constructs a response called by what he calls the Natural Reply:

N1. If some of our highly presumptively warranted moral beliefs are not the product of

evolutionary influence, and we can know which ones are thus immune, then we can utilize such beliefs to ascertain the plausibility of those that are the product of evolutionary pressures.

N2. Some of our highly presumptively warranted moral beliefs are not the product of evolutionary influence.

N3. We can know which beliefs those are. Therefore,

N4. We can utilize such beliefs to ascertain the plausibility of those that are the product of evolutionary influences.

Shafer-Landau thinks the truth of N2 challenges J5. He contends that even if evolutionary forces are insensitive to moral truth it has not been shown even indirectly that most if not all of

warranted moral beliefs are the products of it, therefore we have no reason to doubt our

warranted moral beliefs. Once equipped with these influence free moral beliefs we can build up and test others, this can lead us in a situation where we are able to test if our moral faculty is reliable. This can be done by showing that moral beliefs were generated in which we can have warrant. So even if Joyce's argument for moral skepticism relied on the likelihood that most if not all of our moral beliefs are not justified then the Natural Reply would address that.

So what are these epistemically untainted moral beliefs? Shafer-Landau does not give a definitive answer only an indication of what they could be and how we can arrive at them. We can summarise his views as the following.

S1 Moral Beliefs that have a fitness advantage can be explained via evolutionary pressures S2 There can be moral beliefs that do not have a fitness advantage

S2 Moral Beliefs that have do not have a fitness advantage are less likely due to evolutionary pressures

Therefore

S4 Moral Beliefs that have do not have a fitness advantage must have their origin elsewhere

Some of these paradigm moral beliefs that Shafer-Landau points to as potential contenders are 'impartial benevolence, compassion for vulnerable strangers, kindness to small animals, concern for distant peoples and future generations, and speaking truth to power.⁴' All this sounds rather tempting but there is an obvious problem with his argument namely what about indirect

evolutionary pressures building beliefs that are maladaptive. Joyce spends considerable time in showing how beliefs that are maladaptive may actually have originated from moral behaviour that is highly adaptive such as reciprocity and kin selection⁵. Shafer-Landau argues this is not a

good route of undermining his argument since it risks making the anti realist argument untestable. He thinks this is the case because the anti realist has to provide an indirect

explanation for every moral belief that is maladaptive not just the possibility that such an explanation is possible. Indirect explanations for every maladaptive moral belief is really a

daunting task, not least because it is difficult to sift out adaptive from non adaptive beliefs¹

. He argues that if the anti realist contends that there must be an indirect explanation without

explaining it then they would have undermined their own argument as the very ground that anti realists are using to undermine morality is that our moral beliefs are adaptive. Since anti realists are very far from explaining every warranted moral maladaptive belief in an indirect way this gives room to the Natural Reply. Such beliefs can be used as a foundation to build other moral beliefs and sort out the ones which are distorted by selection.

Shafer-Landau criteria for anti realists is too strict, it is impossible evolutionarily that every physical trait we possess is purely adaptive, maladaptive traits do exist and these are best

explained as byproducts of adaptive ones. However we don't have a complete story of how every maladaptive physical trait came about, does that mean that these traits are not explained by

evolution? Unlike the maladaptive physical traits we do have a plausible powerful hypothesis of how something like kin selection could have led to maladaptive moral beliefs such as helping strangers. Even if we accept his view that moral beliefs that are maladaptive are insufficiently

explained as the indirect byproducts of adaptive traits, there is another force he doesn't consider, genetic drift. Genetic drift has been observed and it is a direct and simple explanation for how maladaptive moral beliefs may have been fixed in the population.

Potency of Pills

Another objection that Shafer-Landau raises is the disanalogy of the belief pills example. He asks us to consider carefully what it means when it is claimed that evolution 'produced' moral beliefs. This production is not a direct creation of a product, it's not like a factory in which on one end there is plastics, metals and glass that go in and fully functioning mobile phones come out of the other end. Shafer-Landau thinks the 'production' of moral beliefs is a misleading notion, because evolutionary pressures only indirectly influence our moral beliefs. A belief pill would work 100% of the time and its influence would be total and complete, so it is not a good analogy as

evolutionary pressures do not operate like that rather they just incline us in certain distorting directions. He assumes that since not all of our moral beliefs are influenced by selection we can use those beliefs as base to correct the other belief (which are distorted by evolutionary pressures) in a similar way that historical misinformation can be corrected by discovery of new facts. Shafer-Landau goes further and says that even if he grants Joyce's hypothesis that without selection we would not have moral concepts at all this wouldn't be a problem. After all without selection we would not have mathematical and perceptual concepts, but that fact does

not cause us to doubt perceptual or mathematical beliefs that we hold. Likewise he thinks we have no reason to doubt moral truths.

Shafer-Landau is right that moral beliefs are not generated like a belief pill, it's not a matter of a implanted belief without a causal history, but I'm afraid he is hasn't fully grasped the intent behind the belief pill metaphor. Joyce didn't want us to imagine that moral beliefs literally

appear out of nowhere, it was a metaphor for the whole system of belief generation including the

faculties that generate it and the concepts that flow out of that. So Shafer-Landau criticism is misdirected. Shafer-Landau does not give us a detailed argument for why mathematics is like morality. There is some ways that mathematics and morality may be similar, they are both

causally inert. Moral beliefs and mathematics are both adaptive. Suppose an ancient man was looking for shelter and saw a cave at a distance, three bears enter it and after a while two leave and he makes the false conclusion that the cave is empty. Such a person would not survive, knowing basic mathematics increases your fitness in a similar way that a moral person is more likely to survive in a tit for tat society. Knowledge of the adaptive advantage of mathematics does not take undermine our confidence that it is objectively true (assuming that we do believe that it is true). So why not treat morality in the same way? In this sense Shafer-Landau could push that morality and mathematics is similar in the respects relevant to the evolutionary

argument, on this view that J1 and J2 may co-exist after all.

This line of reasoning is undermined when we contrast the way that discussions about mathematics and morality differs. Mathematicians have a method of ascertaining mathematical truths hence we see mathematicians in different countries do not have differences of opinion on mathematical conclusions, morality ofcourse differs across the world. Although there is talk of a so called 'ethical consensus' that humans may reach if they sat down and talked it through, history has shown the opposite. The more that people had sat down and discussed morality the more differences have appeared. Consensus may have been achieved to some degree about what certain ethical systems may entail the fact-value distinction and so on, but there is no set method by which two people of opposing moral views can settle their disagreement by arriving at a

moral truth through a set procedure. This is a relevant difference which diminishes any

similarities between mathematics and morality that Shafer-Landau may want to point out. Hence his argument to salvage moral truths from the wreckage of evolution is not fruitful.

Conclusion

I have argued that evolutionary theory can explain morality in natural terms and this motivates the anti realist position. Joyce's argument from genealogical debunking I have shown is unscathed by the criticisms of Shafer-Landau. Realists are in a difficult position, they may try to change the definition of realism to something related to facts about evolution in order to revive it, this strategy could work but that would be a really watered down version of realism that most people won't even bother accepting as a worthwhile pursuit. I believe an argument for realism worthy of its name is unattainable in light of evolution.

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Morality, Nature and Evolution

Did Evolution Make Us Into Psychological Egoists?

I will be making the case that there is no reason to suppose that evolution has made us into psychological egoists. Sober and Wilson¹ put forward four compelling arguments to motivate psychological altruism; pluralistic structure of altruism, generation of sufficient emotions, belief emotion dependency and maladaptive updating. Each of these is independent of the other and a lot can be said about the merits and possible responses to each of them. I will focus on the last one. This argument is supposed to show psychological egoism is not our default position. Stephen Stich² has invoked recent findings in cognitive science in particular subdoxastic 'sticky' states as an objection to this account. I will assess this objection and

show that it is unsuccessful.

Psychological Egoism and Altruism

Altruism can be defined in a number of ways however in a biological context it has a particular meaning, a behaviour is evolutionarily altruistic if its consequences lead to the

enhancement of another organism while incurring a cost to itself. Evolutionary altruism is not concerned with what the psychological motive behind the act is or even if the organism has a theory of mind, all that matters is the action itself. Psychological Altruism is a motivational

state, where a subject intends to help another not for a reciprocal gain or any other benefit but for the other's sake as the ultimate end. Conversely Psychological egoism is a motivational

state in which one's ultimate desire is for one's own selfish interests.

One can do acts that benefit others in the sense of evolutionary altruism and yet be a psychological egoist. Suppose you see someone helping a friend to move home, they spend hours loading and unloading without payment, now you may question them why they are doing this and they answer honestly that they want to help. It is tempting to say that they are a psychological altruist, as not only does their action benefit others, they actually want to help, however this is not enough. It might be the case that they helped as this gives them a sense of self delight and saves them the cost of working out at the gym. It could be the welfare of the recipient is not an end of itself for the helper, rather it is just a means for a deeper selfish goal, in this case their desire can be said to be merely instrumental rather than ultimate. To

see if a person is motivated by a purely altruistic state we need to see not just if they want to help but *Why* they want to.

Proponents of psychological egoism would be committed to the idea that psychological

altruism is a useful fiction, and that our motivational state is always lead by selfish goals, any altruistic behaviour is reducible to egoism. Our desire to help others is an instrumental desire, it is always a means, never an end of itself. Conversely proponents of psychological altruism claim that we can sometimes behave in way that benefits others in an irreducible way, we are capable of sometimes helping others as an ultimate desire in of itself. Instrumental desires are derived from ultimate ones by means of intervening beliefs or belief-like states.

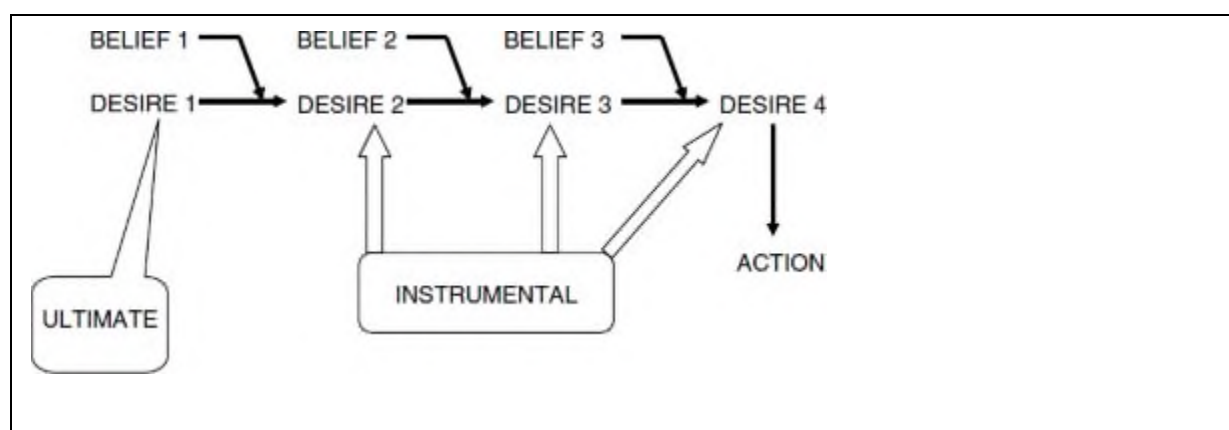


Figure 1.3 Instrumental desires are formed via a causal reasoning process that involves a desire and a belief. An ultimate desire is not produced by this process but rather it is the starting point for it.

It is also helpful to tease out self-directed and other-directed preferences. The former describes the state of the agent exclusively such as an agent wanting himself to succeed, the latter is the state an agent holds for another not himself such as an agent wanting another individual to succeed for that individual's sake. Instrumental desires

hide self-directed preferences as other-directed ones.

Now suppose that an agent only chooses a behaviour based upon what maximises the

satisfaction of their preferences, say a final year student chooses to donate all her books to a fresh undergraduate. She can perform this action with a number of preferences, she may want to help someone as that is what she thinks will bring her status up in eyes of her recipient, or perhaps she wants to give her books away so that the recipient is better off. One of these

preferences is self directed and other is other directed. Using these two preferences Sober makes the following four labels.

Extreme Altruism – Agent cares only about others Extreme Egoism – Agent cares only about themselves

Moderate Egoism – Agent cares about themselves and others Moderate Altruism – Agent cares about themselves and others

When the preferences of others and the agents converge then *both* Extreme Altruists and Extreme Egoists perform the same action. Both these categories describe people that have one kind of preference. Where an agent has a mixed preference like a student who wants a better status and wants to help another student, again the same action will be performed if the preferences converge, but the difference is when the preferences are in conflict. This is where the moderate egoist will chose self interest over welfare of others and the moderate altruist

will chose the other over herself. So in the case of the final year student, she may want to be acknowledged by the recipient student and help them but if she is a moderate altruist, the discovery that the recipient is an ingrate who doesn't recognize a favour will not affect her decision to give the books away, however a moderate egoist on the discovery that the recipient is an ingrate and another undergraduate student is not will be affected by this

conflict of preferences and will not give the books away. What really matters is what an agent does when the self directed and other directed preferences are in conflict, this is *how* to distinguish between psychological altruism and egoism, the former will chose others over themselves and the latter wouldn't. A moderate egoist has Instrumental desires to help and these make them help until there is a conflict between their ultimate self directed desires and

these other directed instrumental ones. Of Course this is not to say a person will be an altruist only if they choose other directed preferences *every* time a conflict between preferences

arises, they may shift from situation to situation.

Reliability of Psychological Egoism

If an action is fitness advancing natural selection can build within the organism a mechanism that is triggered in the appropriate circumstance. For a general long term behavior like parental care for children natural selection may build a proximate mechanism that is triggered to get organisms to care for their children. Here we can make a distinction between the ultimate explanation, natural selection gearing parents to increase reproductive fitness and the proximate mechanism, care towards children.

To get us to act in altruistic or selfish way natural selection needs an appropriate proximate psychological mechanism. It would be tempting to say that evolutionary selfish behaviour is triggered by a selfish mind and

evolutionary altruistic behaviour by a altruistic mind, however this needs some justification, as it is possible that both types of psychological states can explain evolutionary altruistic and selfish behaviour. For example suppose parent A takes care of their children as she has an ultimate desire that is other directed, and parent B also takes care of her children but her ultimate desire is self directed and she has a belief that her happiness is linked to that of her children, so she has an instrumental desire for parental care, both parents take the same action based on different proximate mechanisms. Sober argues there is no a priori reason to think that natural selection would favour a selfish psychological mechanism for selfish behaviour and an altruistic psychological mechanism for altruistic

behaviour⁴. In the case of parental care we need to decide between two hypothetical proximate mechanisms:

(A) Parents care about their children not as a means of their own happiness but as an end in of itself.

(E) Parents care about their own welfare and they are disposed to link their own welfare with that of their children.

Parental care is a good case to test as it is not only evolutionarily altruistic, it also increases the inclusive fitness of the parents and as such there would have been significant selective pressures to build proximate mechanisms that ensure such care is given.

Psychological altruism (A) is a direct solution to the getting organisms to care for their children, for the easiest way for natural selection to ensure care is provided is to endow

parents who do actually care about their kids as an end in of itself, conversely psychological egoism (E) would be an indirect solution. It is easy to fall into the trap of thinking that

altruistic behaviour is due to an altruistic mind simply because it is a direct solution. We know of cases where natural selection has lead to indirect solutions where at first it would seem obvious that the easiest solution would have been the direct one. Sober points to the

fruit fly as an example, it is evolutionary advantageous for them to find places that are humid, a direct solution would have been to give them inbuilt humidity detectors. Fruit flies have no

such thing instead they have the ability to detect where dark places are and there is a

correlation between these dark low light locations and humidity, natural selection has chosen an indirect solution as it has to juggle between competing variables. Sober and Wilson argue

for three component criteria for natural selection to decide which solution to opt for, reliability, availability and energetic efficiency.

In terms of availability it can be argued that the mental framework needed to for (E) to be a proximate mechanism would be sufficient to allow (A) as well because implementation of (E) would include beliefs. Recall that (E) means that parents not only care about their welfare but they believe their welfare is linked to that of their children. For an egoist parent to maximise his or her preferences they must have the ability to detect if their children are doing well.

After detection they have to form beliefs with content such as 'my child is ill' and 'my child is healthy'. Since they can form beliefs about a state of affairs p, they can also form desires about if p should or should not be the case or if another state q is desirable.

It is true that the altruistic desires as an end what an egoistic desires as a means but this distinction Sober thinks does not affect the formation of the basic belief/desire structure, if someone claims (E) is available but not (A) they need to put forward a argument, by default

(A) and (E) should both be accessible proximate mechanisms, I think this is a safe assumption and it makes (A) and (E) on equal footing.

Energy efficiency would certainly have played a substantial role on the selection of (A) or

(E). And there is a lot that can be said about the energy efficiency of some biological features that have been extensively studied. However we don't have enough plausible hypothesis on the evolution of the human mind to make justifiable claims on how one state may be favoured over another. So it is best to assume both states are on par in terms of this variable.

Thirdly reliability is where Sober and Wilson think there is a major difference between (A) and (E); the possibility of maladaptive updating makes (E) less reliable. Recall for the psychologist egoist care towards their children is based on a correlation between their

children's happiness and their own happiness, if children are in pain then the egoist parent feels pain so she must help, but what if her belief that 'my children are in pain, so I am in pain, I must help them' is updated to 'my children are in pain, so I am in pain, I must take Heroin to feel better'. Nothing can stop this untoward updating as it's just a replacement of an instrumental desire by another one to achieve the same outcome. There lots of ways of gaining happiness and relieving pain can be done that are simpler and more accessible than childcare, parents with such mindsets would hardly be ideal for natural selection. Sober & Wilson conclude '*...[The] instrumental desire will remain in place only if the organism... is*

trapped by an unalterable illusion.⁵ Conversely parents who are psychological altruists would not be prone to such maladaptive updating as their motivation to help is based on an ultimate desire that is other oriented, 'I must help my children for their own sake'. Therefore (A) is more reliable than (E) and is fitter and more likely to be true.

Although Sober & Wilson do not put their argument into a single clear master argument, I think this is an accurate representation of their view:

SW1 Evolution can use a proximate mechanism to solve a problem directly or indirectly SW2 Psychological egoism and psychological altruism are proximate mechanisms

SW3 Proximate mechanisms are selected based on availability, reliability and energetic efficiency

SW4 If psychological egoism is available as a proximate mechanism then so is psychological altruism

SW5 Psychological egoism and psychological altruism are on par in terms of energetic efficiency

SW6 Psychological egoism is less reliable as it is prone to maladaptive updating Therefore

SW7 There is insufficient evidence to think evolution has lead to psychological egoism as the default position

SW7 seems like a modest conclusion if the above premises are true, yet this is as far as Sober and Wilson want to take it, they aren't aiming to show psychological egoism is false or even that psychological altruism is our state, rather they have a humbler aim of dislodging the burden of proof in favour of psychological egoism and want to motivate psychological

altruism off the ground as it were. Proponents of psychological egoism would focus their attack on SW6 and here is where Stich also directs his efforts.

Stich's sticky states

Stephen Stich acknowledges that learning can easily change instrumental desires. He accepts the Sober and Wilson's argument in principle is valid however he thinks they haven't

considered recent findings in cognitive science which made SW6 untrue. Stich points to subdoxastic states also known as sticky states, these are mental states that are similar to beliefs in the ways they operate, they represent what the world is like, however they are

particularly different to a subjects normal beliefs because they are not updated or changed

easily. They are not introspectable and stick around the cognitive system even if they are falsified. So it can be argued that the sticky mental states ground the desire for parental care or any other type of helping behaviour, therefore these are not prone to updating after all. The upshot is that sticky states work just as a stopper for maladaptive updating.

Armin Schulz⁶ notes the seriousness of this Stich's objection, he thinks there are three possible responses to it. Firstly we can question the very existence of these sticky states and there is some criticism out there we can latch on to, however he thinks this is a long shot as they are too widely accepted for a full frontal attack on them to work. Secondly we can claim that since these sticky mental states can't be updated they also give rise to ultimate desires not instrumental ones. If this was true then it would be a serious problem for the egoist as his ultimate desire will have no instrumental veneer so it won't be involved in the facade of helping behaviour of any kind. This is tempting but Schulz thinks this won't work either as he notes that these desires *only* exist because of an agent's belief like state which happens to be sticky one, so these desires can be instrumental because if the organism would not have these desires then the corresponding belief like states they are grounded upon would be in one way or another dislodged from an agent's cognitive system. Schulz agrees with Stich that this would be the case even if a more nuanced definition of instrumentality is used. Schulz

argues that the only viable response is simply to accept Stich's objection and concede that

maladaptive updating does not make (E) less reliable and hence Sober and Wilson's argument does not dislodge egoism as the default position. Schulz thinks this is still good news as even if we accept Stich's objection, it is not devastating since it just pushes the debate on egoism

considerably forward. Before the discovery of sticky states the argument would have worked, now it rests on testing of the contents of sticky states. Since testing sticky states can be done

now⁷ the debate about psychological altruism and egoism has moved considerably forward. I think Schulz has given too much ground to Stich. Although he is right about the problems of denying sticky states altogether and claiming that all sticky states are ultimate desires he is hasty in his acceptance of Stich's objection.

Stich's argument seems to me to be the following:

S1 Instrumental desires are grounded on sticky states

S2 Sticky states cannot be prone to maladaptive updating Therefore

S3 Instrumental desires are not prone to maladaptive updating

This argument is problematic, is he saying that all instrumental desires are grounded in sticky states, if yes then why is that the case? he needs to give us a compelling argument which he has not done. It is possible that some instrumental states may be grounded on sticky ones but why all of them. Stich may of course respond that not all instrumental desires are sticky

states. In that case his argument is probabilistic as some instrumental desires may be grounded in sticky states while others are not. This would mean that Stich would have to face the problem that a percentage of instrumental desires are prone to maladaptive updates. Since Psychological Egoism is depend on instrumental beliefs for helpful behaviour and this behaviour is supposed to increase the fitness of the organism, then the fact that a percentage of instrumental beliefs are prone to maladaptive updating makes them less reliable and less likely to be fixed by natural selection. Stich may want to argue that instrumental states that

are free from sticky state influence are low in number. I don't think he can show this is the

case and even if he could it wouldn't help him much since natural selection is a highly sensitive force. Parental care is a fitness enhancing behaviour and there must have been

substantial pressures on the selection of the proximate psychological mechanisms needed to ensure such care. As such if even a very small number of instrumental desires are not based on sticky states then they would be prone to maladaptation and hence they will be less reliable.

Additionally consider false instrumental desires which are based on beliefs such as 'I want to help my children as it will make me taller', on the discovery that helping their children is not making them taller such a instrumental desire will need to be corrected but on Stich's account it can't be altered. So if this is true then we should have all sorts of useless instrumental beliefs which are clogging up our cognitive system, no such evidence exists. On the other hand if Stich wants to argue that only the true instrumental desires are grounded in sticky mental states then he would need to put forth an argument for why that would be case, there does not seem to be any reason to distinguish between true and false types of instrumental desires.

Conclusion

I have made the case that Sober & Wilson's argument against psychological egoism is persuasive. Maladaptive updating is a serious challenge for egoists and Stich's response is not compelling. I believe the argument against psychological egoism has managed to successfully dislodge egoism as the default position and it certainly has increased the likelihood of

altruism being our motivational state.

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Should we want to form true beliefs?

Abstract: Miriam Schleifer McCormick argues that we should want to form true beliefs only because of the instrumental value they possess. Recently Trevor Hedberg has challenged this view. Using the method of reflective equilibrium he argues that the value of true beliefs is best understood as intrinsically valuable. He points out that people pursue bitter truths although they may be void of any benefits, so there must be something about truth we value beyond its instrumental worth. He also attempts to downplay the purely instrumental value of truth for living a flourishing life. I will address these points and will use the distinction between instrumental and ultimate desires to circumvent Hedberg's argument.

Instrumental Account of True Belief

In this essay I will defend McCormick's view that we should want to form true beliefs only for their instrumental value¹. Truth is valuable, most people would agree that they care about

knowing the truth. Either we should care about forming true beliefs because of their instrumental value, as a *means* to something else, or due to their intrinsic value, as an *end* in of itself.

McCormick defends the former by pointing out that true beliefs are quite useful, they help us avoid collisions, create vaccines, and choose healthy lifestyles. Distilling true beliefs from the associated practical benefits to uncover some intrinsic worth is a demanding task. For one that

¹ McCormick, 2015, p.43

chooses this route must show that all truth, even seemingly mundane trivial true beliefs *always* have some *prima facie* value. McCormick works to show that this path is firmly closed. She objects to the view that all true beliefs are valuable by asking us to consider the fact that the content of a true belief is a significant factor in deciding if it is good to hold. Some true beliefs are devoid of any obvious value, others distinctly possess disvalue. It's not hard to generate dangerous true beliefs that are best not known, like knowing how to create miniature nuclear weapons, mind controlling pills, and so on. Additionally true beliefs discovered by immoral means, such as performing experiments on Auschwitz prisoners are not deemed valuable.

Those who adhere to the idea that all true beliefs have *prima facie* value, have to respond to the existence of these true beliefs that clearly possess disvalue. They may do this by discriminating between *all things considered* good and *prima facie* good². A true belief may be *prima facie* good

though given the current variables it may not be good to believe. Being *prima facie* good is only defeasibly good. Analogously, all conceivable morally good actions are *prima facie* good, but all things considered it may not be good to do a certain action. It may be *prima facie* good to feed the ducks at the river, but wrong to do so when that time could've been spent saving a drowning child. So all true beliefs have *prima facie* value even if we don't want to seek them.

McCormick thinks this response doesn't lend support to the view that *all* true beliefs are of *prima facie* value, instead it works against it. She supposes that if one were gifted with superhuman powers, they would not hesitate to do even the smallest morally virtuous act like feeding the

² McCormick, 2015, p.43

ducks at the river and any greater morally virtuous act like saving a drowning child without compromising on either. Would they also use these powers to work out how many grains of sand are on a beach or how many threads are in their carpet? Trivial truths are supposed to have *prima facie* value, but it is not at all clear where the motivation to act on knowing them will come from. They do not seem to have any value of their own. McCormick thinks this gives us good reason to doubt the intrinsic account of valuing true beliefs.

Caring for Truth as an End

Hedberg's view is that an instrumental account is not enough to explain the value of truth. He sees our proper caring for truth as an end in of itself. His argument is based on the method of reflective equilibrium³. This involves trying to achieve a state of coherence among a set of beliefs

by a process of careful adjustments among general principles and considered judgements. He initiates his argument with a judgement that is supposed to be universal: truth is valuable. This judgement has two competing explanations, an instrumental or an intrinsic one. He then sets forth reasons to help determine that an intrinsic account is superior. Hedberg starts by challenging the interest we have in having true beliefs under an instrumental account. He contends that the indispensable utility of true beliefs isn't as clear cut as McCormick would have us think: "We certainly need some true beliefs to pursue our goals, but I am not sure that truth is really so central to their fulfillment as McCormick would suggest. Many people live successful

³ Hedberg, 2017, p. 2

and fulfilling lives despite having worldviews grounded in substantially false belief systems . . . Religious, moral, and political beliefs can radically alter the life plans that people pursue. The problem is that flourishing lives take many forms, and it is clearly possible for some people to flourish even when the worldviews that they have based their lives upon are dominantly false.⁴"

Hedberg highlights the vast diversity of complex belief systems which are inconsistent. Conflicting religious, political, and moral worldviews that people hold can't all be right, so it must follow that most people are committed to false belief systems. Additionally unreasonable behaviours such as ad hoc rationalizations, self-deception, and cognitive biases are common. We have an uncanny ability to avoid or disguise what we don't want to believe, irrespective of its truth. These systems and behaviours have a significant impact on everything from small day to day decisions to entire life plans, and yet people are still living successful lives and fulfilling their goals. Hedberg thinks this is good reason to doubt the instrumental centrality of true beliefs which McCormick uses to ground our tenacious interest for them.

Apart from criticising McCormick's instrumental account, Hedberg gives an argument in favour of the intrinsic value of truth. He claims that most people have a strong *desire* for their beliefs to accurately reflect the way the world actually is. We want to know the true state of affairs even when there is no clear benefit, and even if there is potential harm in us discovering some fact.

Classical sceptical scenarios are enough to illustrate this point. Suppose our perceptions aren't accurate, they're merely the clever deception of an evil demon, or we are brains in vats with sensory data feed into our minds, or we are simply part of 'The Matrix'. Finding the truth about

⁴ Hedberg, 2017, p.3

the real state of affairs would be quite upsetting, and to make matters worse it's unlikely that there will be a change to our situation. Yet Hedberg contends most people would still want to pursue the truth even in these scenarios⁵. Of Course *some* people may actively close every avenue

to finding out the bitter truth, however Hedberg doesn't see this as a problem. The sheer fact that some deliberation is needed before one determines if truth should be pursued or abandoned is significant for him. Clearly there is *something* about true beliefs that make us care for them apart from their ability to help us flourish,

reach our goals or fulfill our desires. We want to find the truth despite it being the cause of a lot of psychological pain, this is enough for Hedberg to determine an intrinsic value of truth: "My alternative proposal is that their non-instrumental value is tied to true beliefs accurately reflecting reality. I believe that most human beings have a strong desire for their understanding of the world to accurately reflect the way that the world actually is⁶". It is good as an end in of itself that we have a true perception of the state of affairs,

independent of truth's lack of utility or potential for harm. Hedberg thinks that if the

instrumentalist account was correct, truth should always be avoided if it lacks utility. He concludes that an intrinsic account of our care for truth is a better explanation about our considered judgement that truth is valuable than an instrumental one.

5 Hedberg, 2017, p.5

6 Hedberg, 2017, p.4

Upsetting Hedberg's Account

On Hedberg's point of flourishing on false belief systems McCormick denies this is plausible: "This is an empirical question but it strikes me as highly implausible that one can have a successful and fulfilling life if most of one's beliefs were false."⁷ She believes the value of true

beliefs is tied to their immense usefulness, this is where I agree with her. However she also thinks that if one has mostly false beliefs then this somehow diminishes the instrumental value of true beliefs, this is where I disagree. This is why she is denying that one can live a flourishing life with mostly false beliefs. She knows that there is a lot of difference between people's moral, religious, and political beliefs and so most people might hold a large number of false beliefs. To mitigate this she denies there is a matter of fact about these: "Most of our true beliefs are mundane and unnoticed; if I step on the brakes my car will stop, if I eat breakfast I will stop being hungry etc. People's political and religious beliefs can radically differ, but on these matters of fact they will agree."⁸

I don't see how McCormick can maintain the claim that our true beliefs are 'mundane and unnoticed' and at the same time argue that our care for truth is indispensable due to its utility. We consciously form true beliefs to fulfill our goals and desires, they certainly are noticeable.

McCormick's claim would require a strong argument about there being no matter of fact about religious, political, and moral issues. She doesn't provide any justification for there being no matter of fact about political and religious beliefs. Even if we assume she can justify this, what

7 McCormick, 2017, Reply to Trevor Hedberg

8 McCormick, 2017, Reply to Trevor Hedberg

about our disagreement on moral truths? If one prefers there is a matter of a fact about morals then McCormick doesn't provide us with a solution, she merely accepts that one can't live a flourishing life with mostly false moral judgements: "If one takes it that moral judgments can be true or false, then a plausible case can be made for the

idea that one cannot live a successful and flourishing life with mostly false moral beliefs.”⁹ McCormick’s assertion that one can’t live a

flourishing life with mostly false beliefs follows too quickly and is hard to justify. There is an easier way to maintain McCormick’s position for the purely instrumental value of truth and having to deal with the fact that most people may hold false beliefs about political, religious and moral issues. It is simply to *accept* Hedberg’s claim that people are able to flourish despite the fact that the various worldviews that they hold are dominantly false. Hedberg thinks this undermines the instrumental value of truth, it doesn’t.

Even if most of our beliefs about political, religious, and moral issues are false, even if we desire to hold comforting false beliefs over true ones, truth still has enormous instrumental value. To see this we need to invoke Hilary Kornblith’s argument for the indispensable nature of true beliefs for anyone who has any goals or desires¹⁰. He salvages his argument from Stephen Stich’s

problematic account of epistemic evaluation¹¹. Stich believes that epistemic evaluation is based

on desires for whatever we intrinsically value. Truth itself is not of any value according to Stich rather it is things like happiness, health, and family. Stich proposes that when evaluating cognitive systems we should select those which privilege things that we value as opposed to

⁹ McCormick, 2017, Reply to Trevor Hedberg

¹⁰ Kornblith, 1993

¹¹ Stich, 1990

those which privilege truth. Consider the straightforward case of someone who has a desire for a toaster and has to choose between two toasters using the cost-benefit model. Both toasters will be analysed for their qualities, a weighting scheme and scale will then be employed, simple arithmetic will follow and the toaster with the highest value will be selected. Utilising this

cost-benefit analysis would be superfluous if our cognitive system was not generating truths. To correctly assign which toaster has the highest value, producing true beliefs about them is necessary. Since Stich proposes that we don’t value truth rather we value other things, this creates a problem for his account, because we should favour cognitive systems that privilege things that we value, rather than systems that simply generate truths. Should we expect a cognitive system that is selected based on happiness to reach the same conclusion as one that is chosen due to its truth producing ability? Uncontroversially we may assume there are no converging conclusions. Stich’s account would lead to varying cognitive systems based on our divergent goals. True beliefs, there is no reason to think, would be generated by these systems. Adopting these Stichean systems would undermine us reaching our dear goals and desires. I wouldn’t know if the toaster I desire is the one which has the highest value among competitors as my Stichean system didn’t help me compute the cost-benefit analysis correctly. If I really want to know which one of the toasters will help me reach my desire I need to have a cognitive system that produces true beliefs, not one chosen for what I value. Hedberg is wrong in claiming that we need ‘some true beliefs to pursue our goals’. Forming true beliefs is instrumentally *indispensable* for anyone who has *any* goals and desires.

Our goals and desires may be divergent, we may even want to hold comforting false political, religious, and moral beliefs. Even for the desire to hold the most comforting false beliefs to be fulfilled we need a cognitive system that produces true beliefs about what false beliefs we value and how to select the most comforting ones. People may hold a large number of false beliefs but this does not diminish the instrumental value of truth, because caring about true beliefs is in the interest of anyone who has any goals and desires, even the desire to hold false beliefs.

Therefore Hedberg's contention doesn't undermine the instrumental value of truth, however his argument for an intrinsic account still needs an answer. Why do we continue to pursue truth when it can cause us immense psychological distress? On first pass if we accept his claim that there is *something* in truth that we value beyond its utility and despite its painful potential, this alone does not show that all truth has prima facie value. His argument is hinged on true beliefs that are of significance to our lives. If one wants to pursue painful truth, such as knowing if they are in the Matrix, deceived by a evil demon, or a brain in a vat, these true beliefs are not trivial.

They have a direct immediate impact on our lives. We have an interest in having

self-understanding of our condition, even if we can't do anything about it. His account covers non-trivial beliefs and fails to cover trivial true beliefs. All true beliefs being of equal prima facie value including the most mundane trivial ones is logically entailed by an intrinsic account of truth, so at best Hedberg's intrinsic account is incomplete. This is a significant failure Hedberg needs to address as trivial true beliefs make up the vast majority of true beliefs that can be acquired.

Still we have a residual question that needs an answer, why do we seek truth when it has potentially detrimental consequences? Hedberg thinks the answer lies in our strong *desire* to have a true picture of what the world is actually like. Obviously such a desire exists, however I am going to argue this doesn't allow Hedberg to purchase an intrinsic account. To see this it would helpful to distinguish between instrumental and ultimate desires¹². If one desires something

instrumentally, they desire it as a *means* to something else, conversely an ultimate desire is sought as an *end* in of itself. Someone may desire money, fame, security, marriage and so many other things, however these are not sought as an end in of themselves. When one desires money, it's not the money itself that they ultimately desire. Physical notes do not hold any intrinsic value, they are merely an instrument to attain happiness. Many desires can be ultimately reduced to a quest for happiness. For this reason many philosophers have argued that happiness is an ultimate desire¹³, we don't desire happiness instrumentally rather we value it as an end in of itself, it is

intrinsically valuable.

The desire to know the truth may be an instrumental desire rather than an ultimate one. If the desire to seek truth is not an ultimate desire it can't have any intrinsic value. One way of motivating the view that seeking truth is purely instrumental is to note that, the desire to know the truth is overpowered by our ultimate desire to be happy and avoid unhappiness. We are capable of ad hoc rationalization and self-deception when truth doesn't suit us. Suppose someone is blackmailed with pictures proving their spouse has been unfaithful. Since they really want to avoid the unhappiness of knowing the truth, they can make up comforting false explanations.

¹² Elliott Sober & David Sloan Wilson, 1998

They could convince themselves that the photos are forged, or that this isn't their spouse but a long lost twin or a lookalike. They will do this because they ultimately desire happiness. Such cases unveil the desire to know the truth as a merely instrumental one. If knowing the truth for its own sake was an ultimate desire, then we should want to know the truth despite the potential painful consequences in *all* situations.

Hedberg may reply that this is not a problem for his account as a person may desire both happiness and truth as ultimate desires and for some people one ultimate desire is greater than another. And this he would claim makes sense when we look at the fact that people sometimes choose painful truth over happiness, while others may choose happiness over painful truth.

The issue with this response is that when we choose truth over happiness it's done with the understanding that a bitter truth will in the long run make us happier. It's a widespread belief that knowing the bitter truth may lead to short term pain but long term happiness. The ubiquitous association of truth with happiness is asymmetrical. When truth is sought, it is linked to happiness, but not vice versa. Happiness is sought without any reference to truth. Watching 'The Wizard of Oz' may cause me to be happy, but there is no part of me that desires to watch it for its truth value. Quite the opposite, we love fiction, love a good ending no matter how unrealistic. If we really desire truth as an ultimate desire then we should be averse to any types of false narratives, whether we read them in children's books or watch them in movies. Happiness is an ultimate desire, no one actively does something to make themselves unhappy. If truth was an ultimate desire then no one should actively fill their brains with false ideas, even for entertainment. Happiness as an ultimate human desire is widely accepted and justifiable, truth

does not quite fit the bill to be an ultimate desire. Since it is not an ultimate desire, truth does not hold any intrinsic value. Hedberg's prize horse, our desire to seek truth about the actual state of affairs is only an instrumental desire after all.

Concluding Remarks

In this essay I have defended McCormick's instrumental account for valuing true beliefs. To motivate his account for the competing intrinsic value of truth, Hedberg employs reflective equilibrium. To explain the considered judgement that we all hold, that 'truth is valuable' he seeks to invoke an intrinsic account of true belief. Hedberg downplays the instrumental value of truth by claiming that truth isn't central to living a flourishing life as McCormick thinks. He also points to the fact that we pursue truth despite its painful consequences and this gives us a reason to think there is something valuable about truth beyond utility. Hedberg's attempt to minimize the instrumental value of truth can be addressed by Kornblith's argument for the value of truth for anyone who has any goals or desires. Additionally I have appealed to the distinction between instrumental and ultimate desires to undermine his intrinsic account for valuing true beliefs. No one denies that truth has enormous instrumental value, but those who claim something beyond this have the burden of proof on their shoulders. Hedberg's challenge to the purely utilitarian motivation to care about forming true beliefs does not work. We should want to form true beliefs only for their instrumental value.

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Was Darwin a racist?

By Abdur Rahman

This is a response to AronRa's video "[Racial Darwinism](#)". My intention is not to just refute him – there are plenty of refutations of him, [here](#) and [here](#) – but rather to educate the Muslims. My intention is also to make a video with Subboor on this topic and thus this article serves as a supplement to the video. It must be noted that I am not here to defend the creationist's worldview nor the alleged crimes they committed, rather, I am simply asking and answering the question whether Darwin was a racist person and whether Hitler was an evolutionist. These questions are not limited to any partisan group. I use the acronym "TS" to refer to the time stamps on AronRa's video and "n." for native. Finally, this article is not an exhaustive refutation of AronRa, but as already mentioned, a supplement to the video. The reason being is because AronRa used photos and it would be difficult to comment on each photo with the texts within them, thus it's easier to review them by video than by writing about them.

AronRa's video is, consciously or unconsciously, split into three segments: roughly the first five minutes dedicated to show racism preceded Darwin, the next five minutes dedicated to Adolf Hitler whilst the remaining ten to Charles Darwin. His main points can be summed up into three: (1) racism preceded Darwin (2) Hitler was not an evolutionist and finally (3) Darwin was not a racist. For each point he shares what he considers to be relevant evidences. Unquestionably, there is no doubt regarding point one. Point two and three, on the other hand, are simply false.

Here I will simply argue that Darwin was a racist and indeed Hitler was an evolutionist. A point by point refutation of his video is, to re-mention it again, to be done on a video and not here.

Since AronRa began with Hitler before Darwin, I think its appropriate to follow his method. He claims that Hitler was a creationist (TS 8:26-9:12) and even banned Darwin's books (TS 9:47-10:08) thus how can Hitler be an evolutionist? He would have been right if only his main points were correct. Hitler was the dictator of Germany and all dictators have close friends they trust – or as they are known as the 'confidant'. Hitler's confidant, Otto Wagener, after World War II, wrote his diary *Hitler: Memoirs of a Confidant* (1985). In his memoir, he makes clear that Hitler believed "Everywhere in life only a process of selection can prevail. Among the animals, among plants, wherever observations have been made, basically the stronger, the better survives." By now it is clear its evolutionary but Wagener carries on. "Selection therefore runs a natural course. As Darwin correctly proved: the choice is not made by some agency – nature chooses." [Wagener, p. 40]. Hitler himself provided a long evolutionary account of world history in his book, *Second Book* (a separate book from *Mein Kampf*). In it, he says,

"The history of the world in the ages when humans did not yet exist was initially a representation of geological occurrences. The clash of natural forces with each other, the formation of a habitable surface on this planet, the separation of water and land, the formation of the mountains, plains, and the seas. That is the history of the world during this time. Later, with the emergence of organic life, human interest focuses on the appearance and disappearance of its thousandfold forms. Man himself finally becomes visible very late, and from that point on he begins to understand the term 'world history' as referring primarily to the history of his own development – in other words, the representation of his own evolution. This development is characterised by the never-ending battle of humans against animals and also against humans themselves. Finally, out of the unclear tangle of individual beings, formations rise – families, tribes, peoples, states. The portrayal of their genesis and dissolution alone is the replication of the eternal struggle for survival." [Weikart, p. 231].

Three years before Hitler would commit suicide, he was among his henchmen discussing vegetarianism – Hitler was a vegetarian [Kershaw, vol 1, p. 261-2] – and in order to prove the superiority of vegetarianism, Hitler said "The apes, *our relatives in antiquity*, are pure herbivores." [Weikart, p. 241. My emphasis].

In 1927, in his talk "What is Nazim?", Hitler spoke against pacifism because life is all about struggle for existence and then said that humans are,

"...the product of this struggle. If your ancestors had not fought, today you would be an animal. They did not gain their rights through peaceful debates with wild animals, and later perhaps also with humans, through the comparative adjustment of relations by a pacifist court of arbitration, but rather the earth has been acquired on the basis of the right of the stronger." [Weikart, p. 234].

Many more quotations could be cited and they all explicitly betray the claim that Hitler was a creationist. Scholars on Hitler and Nazism have for years noticed the connection between social Darwinism and Hitler's belief, for example: Ian Kershaw, Joachim C. Fest, Richard J. Evans and Alan Bullock. [Kershaw, vol 1, pp. 288, 290, 296; vol 2, p. 19 and Fest, pp. 154, 319, 437 and Evans, pp. 34-35, 451 and Bullock, pp. 389 and 398]. AronRa's argument that Hitler was a creationist is based on a blatant misreading of *Mein Kampf*, in which he merely cherry picks words and makes a story out of it rather than letting the context speak for itself. There is no question that evolution is clear in *Mein Kampf*. As a matter of fact, the historian Ian Kershaw said that the ideology of Hitler in both *Mein Kampf* and *Second Book* was "social-Darwinist and racially determinist." [Kershaw, vol 2, p. 19].

AronRa's second point is that Hitler allegedly banned and even ordered Darwin's books to be burnt [TS 9:48-9:53]. To understand this, you must know where AronRa gets his information from. AronRa relies heavily on an evangelical evolutionary [site](#), TalkOrigin, which fed him the nonsense regarding Hitler banning Darwin's books (note: they never mention burning). The information is based on a misunderstanding. The *Manchester Guardian* and *Northern Whig* newspapers in 1933, reported in capital letters,

"NAZIS BAN DARWIN AND FREUD"

But how much truth is in that? TalkOrigin got their information from "[When Books Burn](#)" website which appears to be part of the library of Arizona. The website provides translated documents from the Nazi period, more specifically, an article in a Nazi journal *Der Bücherei*. The article lists books for "purification" – i.e. to be banned. Yet before delving into the article, the website humbly states "What was forbidden? What was burned? It is difficult to say for sure..." Right from the get go, the reference AronRa relies on does not even agree with him. Worse, the same website relies on Leonidas Hill's chapter in *The Holocaust and The Book*. Hill says that the Nazi's pillars were "Romanticism, nationalism, racism, *social Darwinism*, and antimodernism..." and to combat

Coming to *Der Bücherei*, nowhere does it mention that Darwin's books are to be banned. It merely mentions that the books to be banned are,



Nobody knows what “primitive Darwinism” is but what must be noted is that any other non-primitive Darwinism was not banned and since Darwin was not mentioned by name, it would be disingenuous to make the claim that any of Darwin’s literature was banned. AronRa specifically said that Hitler “banned” and “ordered” Darwin’s books to be burnt [TS 9:48-9:53]. With such a claim, there must be a document officially signed by Hitler or any official of the Nazi state. Does he have such a document?

262

XI. Lebenskunde.

Der Werdegang des Menschen (Lebensstufen). (Reihenfolge von unten nach oben.)

Zeitraum	Lebensstufen	Lebensstufenstufen	Kulturzeiten
Zeitraum Steinzeit 15000 bis 20000	Urszeit Eiszeit Jungsteinzeit Neolith	Steinzeit	Steinzeit Jüngere Steinzeit Ältere Steinzeit
Zeitraum Bronzezeit 6000 bis 1000	Urszeit	Urszeit (Urszeit)	Urszeit Jungsteinzeit Neolith
	1. Lebensstufe	Urszeit (Urszeit)	
	2. Lebensstufe	Urszeit (Urszeit)	
	3. Lebensstufe	Urszeit (Urszeit)	
	4. Lebensstufe	Urszeit (Urszeit)	
Zeitraum Eisenzeit 1000 bis 500	Urszeit	Urszeit (Urszeit)	Urszeit Jungsteinzeit Neolith
	1. Lebensstufe	Urszeit (Urszeit)	
	2. Lebensstufe	Urszeit (Urszeit)	
	3. Lebensstufe	Urszeit (Urszeit)	
	4. Lebensstufe	Urszeit (Urszeit)	
Zeitraum Römische Zeitraum 500 bis 1000	Urszeit	Urszeit (Urszeit)	Urszeit Jungsteinzeit Neolith
	1. Lebensstufe	Urszeit (Urszeit)	
	2. Lebensstufe	Urszeit (Urszeit)	
	3. Lebensstufe	Urszeit (Urszeit)	
	4. Lebensstufe	Urszeit (Urszeit)	
Zeitraum Mittelalter 1000 bis 1500	Urszeit	Urszeit (Urszeit)	Urszeit Jungsteinzeit Neolith
	1. Lebensstufe	Urszeit (Urszeit)	
	2. Lebensstufe	Urszeit (Urszeit)	
	3. Lebensstufe	Urszeit (Urszeit)	
	4. Lebensstufe	Urszeit (Urszeit)	
Zeitraum Neuzeit 1500 bis 1800	Urszeit	Urszeit (Urszeit)	Urszeit Jungsteinzeit Neolith
	1. Lebensstufe	Urszeit (Urszeit)	
	2. Lebensstufe	Urszeit (Urszeit)	
	3. Lebensstufe	Urszeit (Urszeit)	
	4. Lebensstufe	Urszeit (Urszeit)	
Zeitraum Moderne 1800 bis 1900	Urszeit	Urszeit (Urszeit)	Urszeit Jungsteinzeit Neolith
	1. Lebensstufe	Urszeit (Urszeit)	
	2. Lebensstufe	Urszeit (Urszeit)	
	3. Lebensstufe	Urszeit (Urszeit)	
	4. Lebensstufe	Urszeit (Urszeit)	
Zeitraum Gegenwartig 1900 bis 2000	Urszeit	Urszeit (Urszeit)	Urszeit Jungsteinzeit Neolith
	1. Lebensstufe	Urszeit (Urszeit)	
	2. Lebensstufe	Urszeit (Urszeit)	
	3. Lebensstufe	Urszeit (Urszeit)	
	4. Lebensstufe	Urszeit (Urszeit)	

Further evidence to why Darwinism was far from being banned, Darwinism was explicitly taught in Nazi schools. If evolution was banned, you would expect the story of Adam and Eve to be popularised but we see the very opposite. I have in my possession a number of Nazi biology textbooks which were used at the time. I will share a few authors and some illustration to drive the point home. The famous authors, Karl Zimmermann and Erich Meyer, wrote (as far as I'm aware) four volumes of *Lebenskunde*. They were biology textbooks endorsed by the Nazi state. Hans Schemm, the appointed minister of education in Bavaria by Hitler [Kershaw, vol 1, p. 462], wrote a short preface on it. *Lebenskunde* is filled with evolution. Apparently, Hans Schemm, the ministry of education of Bavaria, was unaware of the ban. Of course, *Lebenskunde* is not the only one, *Biologie* by Dr. O. Steche, Dr. E. Stengel and M. Wagner also contains evolutionary stories. *Biologie für höhere schulen* by Jakob Graf and finally *Stammesgeschichte der Menschheit* by the well-known evolutionary anthropologist professor Hans Weinert. All of them and countless more books for schools and otherwise, were published under the Nazi state. It would simply be nonsensical to state that evolution was condemned to the fire whilst it was taught in schools concurrently. The analogy that Hitler was not an evolutionist and that Hitler or the state banned evolution is tantamount to denying Hitler was anti-Jewish. Flimsy, out-of-context and even contradictory evidences cannot push the reality away that Hitler was an evolutionist and the state taught evolution.



Coming to AronRa's final segment which is dedicated to Darwin, he makes one main point: Darwin was not a racist. He lists various reasons for that which are, as follows:

Secondly, AronRa pushes a baseless claim that the acceptance of Darwin's theory somehow led to a more monogenistic worldview among academia, so much so that Darwin's prediction of "...the dispute between the monogenists and the polygenists will die a silent and unobserved death" have become a reality today [TS 14:30-42]. However, Darwin's theory only justified polygenism further since Darwinism was and is compatible with both mono- and polygenistic theories [Jahoda, p. 76; Allan, J. M, 1869, p. 178]. Between late 19th century till mid-20th century, there was a plethora of human evolutionary theories, many of them polygenistic [Delisle, 2016]. What ultimately led to the demise of polygenism was the horrors of World War II – in other words, social pressure not Darwin's theory, pushed polygenism away (though it's not gone, it is simply considered "racist" to be a polygenist. When society changes, polygenism will return).

Finally, it is true that Darwin believed all races of men are one specie but that does not in any way determine conclusively whether the person is a racist or not. Just because Darwin did not distinguish the races of men as separate species does not mean he did not distinguish them as subspecies (or just "race") in which the white "civilised" race is at the top whilst the blacks – Fuegians, native Australians, native Americans and "certain negro tribes" to use Darwin's own terms – are at the bottom based on their alleged inferiority anatomically, intellectually and morally. In the words of Darwin's biographers "He [Darwin] thought blacks inferior but was sickened by slavery..." [Desmond & Moore, 1992, p. xix].

As for the remaining three, I will go through them one by one.

Nowhere, not in any of Darwin's works or his letters, especially after the *Beagle* voyage, did he ever proclaim the equality of races. I could extract quotes inexorably but suffice to share a few. In a letter to Joseph Hooker prior to publishing *Origin*, Darwin denies that there is any hierarchy when it comes to plants and animals (though he was not even consistent in that as *Origin* would show later on),

"...except in classes which can loosely be compared to man." [Darwin to Hooker, 31/12/1858]

In the very quote which AronRa quotes [TS 12:43] it explicitly excludes 'certain negro tribes' from having similar anatomy from the rest of mankind. Darwin wrote that when it comes to taxonomy, he will use the "generally-admitted principles to the races of man..." and he concludes,

"Even the most distinct races of man, *with the exception of certain negro tribes*, are much like each other in form than would at first be supposed." [Darwin, 2013 p. 168. My emphasis]

AronRa somehow concludes after reading this passage (and the remaining sentences with his cherry-picked highlighted words) as proof Darwin believed in the equality of all men rather than the opposite! Darwin did not base this conclusion on nothing. One of his evidence is the fact that when humans evolved from the common ancestor, man's feet must "have been rendered flat, and the great toe peculiarly modified, though this has entailed the loss of the power of prehension." At first glance, this appears non-racial, a general observation which must have happened if man evolved from a common ancestor. However, Darwin carries on and wrote that,



"With some savages, however, the foot has not altogether lost its prehensile power, as shewn by their manner of climbing trees and of using them in other ways." [Darwin, 2013, p. 106]

Darwin even added a reference to prove this point. The reference is from none other than Darwin's German counterpart Ernst Haeckel, who is an explicit racist. [Desmond & Moore, 1992, ch. 36]. Instead of combating the racism in Haeckel's book, Darwin wholeheartedly recommended it and stated "if this [Haeckel's *Natürliche Schöpfungsgeschichte*] work had appeared before my essay had been written, I should probably never have completed it." [Darwin, 2013, p. 5]

Not only did he claim that the so-called savages were anatomically closer to the common ancestor by providing pseudo-scientific evidences, such as the retaining of the prehension power among "some savages" as mentioned above, but he also dwelled into the difference between the intelligence & consciousness of the so-called civilised and savage races. For example, Darwin had a peculiar racist view towards the native Australians, claiming that the wife of a "degraded Australian savage, who uses hardly any abstract words and cannot count above four..." can hardly "...exert her self-consciousness, or reflect on the nature of her own existence." [Darwin, 2013, p. 48, see also p. 29] What is even more dreadful is that he contrasted the n. Australian's alleged lack of individuality, consciousness and abstraction to an old dog.

He continues on the next page that "most savages" admire "hideous ornaments and... equally hideous music..." Once again, this would appear to be a mere opinion since everyone has different taste of music and sense of beauty, or ornaments as Darwin said. However, Darwin carries on and wrote,

“...it might be urged that their [savages] aesthetic faculty was not so *highly developed as in certain animals*, for instance, in birds...” [Darwin, 2013 p. 49. My emphasis]

Darwin did not end there, he droned on, as if he had to mention that animals are not,

“...capable of admiring such scenes as the heavens at night, a beautiful landscape, or refined music; but such high tastes, depending as they do on culture and complex associations, are *not enjoyed by barbarians or by uneducated persons*.” [Ibid. My emphasis].

Apparently, “barbarians” (a term which Darwin used to refer to the races of n. Americans and Fuego de Tierra) are incapable of admiring “high tastes” such as the night sky, beautiful landscapes and refined music. It is incredible that even when it comes to activities, he would categorise them as high or low, and the “barbarous” races of man, who are low, cannot admire “high tastes.” A salient point that should be noted is the categorisation of the ‘barbarians’ and the uneducated in the same category – a tenacious myth in many forms that still is with us today, i.e. blacks are uneducated. As a matter of fact, Darwin had to mention near the end of his book that those who do not ponder over “the phenomena of nature” is “like a savage”,

“He who is not content to look, *like a savage*, at the phenomena of nature as disconnected, cannot any longer believe that man is the work of a separate act of creation.” [Darwin, 2013, p. 633. My emphasis].

Of course, Darwin had to provide an evolutionary explanation as to why “savages” are uneducated and incapable of enjoying life like the civilised races. This, according to Darwin, is ultimately connected to their mental faculties. He provides three main reasons, which I will simply quote and let you decide whether it is racist or not.

“The chief causes of the low morality of savages, as judged by our standards, are, firstly, the confinement of sympathy to the same tribe. Secondly, *insufficient powers of reasoning*, so that the bearing of many virtues, especially of the self-regarding virtues, on the general welfare of the tribe is not recognised. Savages, for instance, fail to trace the multiplied evils consequent on a want of temperance, chastity, &c. And, thirdly, *weak power of self-command*; for this power has not been strengthened through long-continued, perhaps inherited, habit, instruction and religion.” [Darwin, 2013, p. 74. My emphasis].

I believe I do not need to explain why believing savages have “insufficient powers of reasoning” and “weak power of self-command” is racist. What shocks me personally is that Darwin met “savages” & “barbarians” and many of them helped him. Yet, years later, Darwin dared to write that “sympathy” among savages are restricted to only the members of their tribe and not to those outside of the tribe – something which only the “civilised races” can do according to him. In fact, Darwin provides a long example to prove that “savages” do not help those who are outside of their tribe by sharing a story of a drowning man,

“It is evident in the first place, that with mankind the instinctive impulses have different degrees of strength; a *savage will risk his own life to save that of a member of the same community, but will be wholly indifferent about a stranger*: a young and timid mother urged by the maternal instinct will, without a moment’s hesitation, run the greatest danger for her own infant, but not for a mere fellow-creature. *Nevertheless many a civilized man, or even boy, who never before risked his life for another, but full of courage and sympathy, has disregarded the instinct of self-preservation, and plunged at once into a torrent to save a drowning man, though a stranger*. In this case man is impelled by the same instinctive motive, which made the heroic little American monkey, formerly described, save his keeper, by attacking the great and dreaded baboon. Such actions as the above appear to be the simple result of the greater strength of the social or maternal instincts than that of any other instinct or motive; for they

are performed too instantaneously for reflection, or for pleasure or pain to be felt at the time; though, if prevented by any cause, distress or even misery might be felt. [Darwin, 1874, p. 110, thanks to Zitzer, 2016, p. 105. My emphasis]

The sheer brutal lie that “savages” do not help strangers is something difficult for me to comprehend because, as I mentioned, Darwin witnessed with his own eyes, when he was on HMS *Beagle*, that this is simply false. He would write that among “barbarians”, they do not regard the opinion of women and essentially treat them as slaves and,

“Most savages are utterly indifferent to the sufferings of strangers, or even *delight* in witnessing them. It is well known that the women and children of the North-American Indians aided in torturing their enemies. Some savages take a horrid pleasure in cruelty to animals, and *humanity with them is an unknown virtue.*” [Darwin, 2013, p. 72. My emphasis].

How fascinating that savages cannot admire the heavens at night and the beautiful landscapes, but they sure do indulge and “delight” in witnessing torture. The desperation to prove that “savages” are immoral is evident.

I have much more to share but I do not intend to write a large article. Leon Zitzer, whose book currently is the finest on this topic, wrote an 800-page tome listing many of Darwin’s racist views and refuting many of the nonsense that evangelical evolutionists, like AronRa, use to defend Darwin. Thus, this brief article of a few pages compared to the giant 800-page tome, is only meant to share the tip of the iceberg.

Let’s move on to his fifth point. AronRa claims that Darwin believed the extermination of the n. Australian race as “tragic”. However, if you look at the video [TS 17:00-11], AronRa highlights the words “After the famous hunt by all the colonists...”. This, according to AronRa, somehow proves Darwin felt tragic regarding the racial extermination the n. Australians witnessed. Needless to say, this proves nothing. You cannot extrapolate or justify in any way that those words prove Darwin felt deplored. It is simply talking about a famous (not *infamous*) hunt, that is all. What matters is not what Darwin said here, but rather, in what context the sentence appears in. Darwin wanted to prove that the “civilised” races are higher than the “savages”. To prove this point, he cites the “wonderful progress” of how colonists took over America as an example of natural selection [Darwin, 2013, p. 137; Darwin, 1874, p. 142] – If Darwin considered the extermination of the n. Americans as “wonderful progress”, then it is already doubtful he would consider the n. Australian genocide any different. Furthermore, Darwin used the proof of adaptability. The n. Australians were, according to the sentence AronRa cites, weak in terms of adaptability, compared to the Europeans and then he, Darwin, sadistically wrote that out of the 20,000 or 7000 n. Australians, only 120 remained. These 120 n. Australians were taken to Flinders Island from their home-land Tasmania, where the colonists,

“...well-treated...”

the n. Australians. Yet despite the good treatment and despite their apparent healthiness, the n. Australians still died. [Darwin, 1874, p. 183. The concept of n. Americans and n. Australians losing out in the struggle for existence can also be found in Haeckel, 1880, p. 256. It’s as if Darwin copied Haeckel].

In other words, this sentence that AronRa desperately butchered out-of-context, was actually a statement by Darwin to prove that the n. Australians were incapable of adapting to other lands, unlike the colonisers who colonised and settled in Australia. Since they were weak against the colonists, their doom was certain according to natural selection, much like the native Americans, whose eradication was “wonderful progress.” In other

places, Darwin said the extermination of the Australians from Tasmania has allowed Tasmania to "...enjoy *the great advantage* of being free from a native population." [Zitzer, 2017, p. 10. My emphasis]

The shameful suggestion that the n. Australians were "well-treated" after almost 20,000 or 7000 of their family members being systematically raped, tortured and slaughtered in front of their eyes is beyond despicable, morally outrages. Try to imagine a historian or a scientist or even AronRa talking of the Jews or blacks being "well-treated" by the Nazis in the extermination camps. The outrage is beyond comprehension.

There is more and is ultimately connected to his sixth point. AronRa blindly quotes Darwin [TS 17:39-42], who said near the end of *The Voyage of the Beagle*,

"...I thank God, I shall never again visit a slave-country." [Darwin. 1997 [1845], p. 473].

However, this sentence is at best for public consumption. Darwin had two diaries, one is the original handwritten diary and the other is the published edition which is heavily based on the handwritten diary – ultimately known as the *Voyage of the Beagle*. That sentence is not in the original diary but rather in the published edition. In a letter to Darwin's former servant on the HMS *Beagle*, Syms Covington, who was living in Australia, Darwin wrote that he feared the goldrush from California would cause inflation in the UK and if this happens, then Darwin would "certainly emigrate" to Australia. This contradicts the statement that Darwin thanked God for not wanting to visit a slave-country. He clearly desired to go to Australia which, as Darwin himself wrote, was a place where genocides and slavery were occurring. But that is not all, the letter carries on,

"I am forced to live the life of a hermit, but natural history fills up my time, and I am happy in having an excellent wife and children. Any particulars you choose to tell me about yourself always interest me much. What interest can you get for money in a safe investment? *How dear is food*; I suppose nearly as dear as in England? *How much land have you*? I was pleased to see the other day that you have a railway commenced, and before they have one in any part of Italy or Turkey. The English certainly are a noble race, and a *grand thing it is that we have got securely hold of Australia and New Zealand*. Once again accept my thanks for your valuable collection of barnacles, and believe me, dear Covington, your sincere friend, C. DARWIN." [Darwin to Covington, 23/11/1850. My emphasis].

To consider the colonisation of New Zealand and Australia as a "grand thing" is no different when Hitler believed it was a grand thing to exterminate those, he believed, to be racially inferior. Certainly, it contradicts AronRa's claim that Darwin felt "tragic". The words "*How much land have you*?" is the epitome of evil because where do you think the 'land' came from? There was at that time the myth that Australia was an empty land [Zitzer, 2017, p. 43-44], the same pernicious myth pushed by Zionists when speaking of Palestine [Pappe, ch. 1]. I do not believe Darwin believed in such a myth (or else his sadistic "evidence" that n. Australians are poorly adapted would be non-existent) but he certainly could write "*How much land you have*?" as if he's corresponding with a native rather than a foreigner in a foreign land whose native peoples were exterminated to near extinction and is *still* being ruled by colonisers.

How could Darwin talk about being "happy" with his wife and children but also write that the 120 n. Australians who witnessed their wives and children being exterminated in front of their eyes, were "well-treated" after they were forced into exile on a different island away from their ancestral home-land Tasmania?[1]

Darwin, near the end of his book on his voyage, wrote,

"It is impossible for an Englishman to behold these distant colonies without a high pride and satisfaction. To hoist the British flag, seems to draw with it as a certain consequence, wealth, prosperity, and civilisation." [Darwin, 1997 [1845], p. 479].

So much for feeling tragic.

In FPS video games, like Call of Duty or Battlefield, you kill to level up. Darwin could, unintentionally and indirectly, be considered the first FPS designer. For Darwin, when the "higher races of men", like the Anglo-saxon race, become high enough, they will "*spread & exterminate whole nations*"; & in consequence how much the Human race, viewed as a *unit*, *will have risen in rank*." [read "rank" as "level up". Letter from Darwin to Charles Kingsley, 6/2/1862; Zitzer, 2017, pp. 8-9. My emphasis].

What I have shared above is no different to what eminent scholars say on Darwin. There are mainly four: Leon Zitzer, Adrian Desmond, James Moore and Janet Browne. The best of them all is unquestionably Leon Zitzer. His 800-page tome (and a summary of that tome) is the finest when it comes to Darwin's racism. Zitzer left almost nothing to look for. He navigated all of Darwin's works, letters and notebooks and for such endeavour, I admire and recommend his work. I do differ on his views why Darwin considered slavery to be wrong *after* he converted to evolution but nevertheless nothing comes close to this magnificent and elaborate book. Zitzer wrote, as if he was replying to AronRa, that Darwin was,

"...rather coldly reciting the statistics that point towards the inevitable eradication of native population; no hint that he feels this is an injustice or mourns their loss." [Zitzer, 2016, p. 565].

As for Adrian Desmond and James Moore, their book, *Darwin's Sacred Cause*, does not exactly go into detail and thus fails to meet the standard of Zitzer's. However, they do admit that Darwin believed that man is split into races [p. 116] "with the white man accorded the 'best' intellect... Already Darwin was accepting it as an evolutionary norm. Wedded so early to his evolutionary matrix, this supremacist image would itself be brought to justify later ethnic cleansing policies, however abhorrent to Darwin's own humanitarian ideals." [p. 148][2] They carry on saying Darwin was "biologizing colonial eradication, Darwin was making 'racial' extinction an inevitable evolutionary consequence." [p.149]. Whilst James Prichard was busy warning the people of England about the genocide of the Australians, "Darwin was already naturalizing the cause and rationalizing the outcome." [p. 151] and that the "Europeans were the agents of Evolution." [Ibid]. To quote one last quote from their book, they said,

"So the ideologue [Darwin] who was concerned with ending slavery ironically began naturalizing the competition of white minds with dark bodies." [p. 147]

Despite many important information in this book, there are some comments I disagree with – especially with their conclusion that his abolitionist tendencies, his so-called "humanitarianism", led Darwin to accept monogenism. On page 96, they concede Darwin was placing the races of men into a hierarchy but he did so only with "behaviour and morality, with their technological and civilizational consequences" but "not anatomically, like the phrenologists and pluralists." Though pages later they also admit Darwin graded the races of man intellectually as I already mentioned. But as noted above, Darwin indeed did grade people anatomically, claiming that "some savages" have ape-like foot, or, which I did not mention above, the mammals have high sense of smell for the purpose of hunting or in warning them of danger. In man, on the other hand, the sense of smell is greatly reduced.

"But", Darwin wrote, "the sense of smell is of extremely slight service, if any, *even to savages*, in whom it is generally *more highly developed* than in the civilised races." [Darwin, 2013, p. 19. My emphasis] He carries on saying that the third eye-lid, which is "fairly well developed in the two lower divisions of the mammalian series..." is "*somewhat larger in Negroes and Australians than in Europeans*" [Ibid, pp. 18 and 27. My emphasis. Though Darwin got his ideas from many racist authors, it is undeniable that Ernst Haeckel had a major influence on him. Haeckel wrote "*If we compare the uncivilized savages with civilized nations, we find among the former a development of the organs of sense—sight, smell, and hearing—such as civilized nations can hardly conceive of. On the other hand, the brain, that is mental activity, among more civilized nations is developed to a degree of which the wild savages have no idea.* Once again it is as if Darwin simply copied Haeckel. Haeckel, 1880, p. 249]].

The most explicit and clear example of grading people anatomically comes from a sentence which AronRa thinks is not racist. Let us first know the context. Darwin was responding to a charge he heard countless times, the classic creationist argument: if-evolution-is-true, then-why-are-there-no-missing links? or as Darwin noted,

"The great break in the organic chain between man and his nearest allies [i.e. apes/monkeys], which cannot be bridged over by any extinct or living species, has often been advanced as a grave objection to the belief that man is descended from some lower form; but this objection will not appear of much weight to those who, convinced by general reasons, believe in the general principle of evolution. Breaks incessantly occur in all parts of the series, some being wide, sharp and defined [An omen of things to come, especially Stephen Jay Gould and his "punctuated equilibrium" theory], others less so in various degrees [the future "Neo-Darwinism"]..."

Up until now, there is nothing that may appear to grade blacks near apes, gorillas specifically, but I just wished to note that Darwin's mixture of both Neo-Darwinism and Punctuated Equilibrium is a fascinating detail, something Stephen J. Gould noted before [Gould, 2002]. Also, since the context is regarding missing links, then it is clearly referring to fossils, or in other words, anatomy. Darwin carries on,

"At some future period, not very distant as measured by centuries, *the civilised races* of man will almost certainly *exterminate and replace* throughout the world the *savage races*. At the same time the anthropomorphous apes, as Professor Schaaffhausen has remarked, will no doubt be exterminated. The *break* will then *be rendered wider*, for it will intervene between man in a more civilised state, as we may hope, than the Caucasian, and some ape as low as a baboon, *instead of as present between the negro or Australian and the gorilla.*" [Darwin, 2013, p. 154-55. My emphasis].

I, once again, believe I do not need to explain this crave for the blood of blacks and Australians as racist but note how he says that the current "break" is between a "negro or Australian" and the "gorilla". If the "civilised races" exterminate the "savages", along with the poor apes, then the break will be rendered wider, from Caucasian to baboon. Somehow AronRa cannot detect the appetite for blood and explicit racism in these words. All you need to do is replace "civilised races" with "Aryans" and "savages" with "Jews" and you got the recipe for Hitler's ideological desire, yet Hitler is evil but Darwin, according to Gould, was simply being "paternalistic" towards the blacks. How on Earth did Gould reach such a conclusion boggles the mind. [Zitzer, 2017, pp. 7-8]

All of this, and others I did not mention, simply contradicts Desmond and Moore's claim that Darwin did not grade people by anatomy. For Darwin everything must be explained – even the skin colour (Darwin considered the black skin an example of "savagery"; he cited the example of a white sheep "reverting" back to a black sheep as an "*injurious* character which tend to reappear through reversion..."! Of course, "*injurious characters*" will be

“*eliminated*”. Not even the sheep are safe from Darwin’s obsessive racism! [Darwin, 2013, p. 133 and 10. My emphasis]).

But despite this error and a few others, I still highly recommend *Darwin’s Sacred Cause* for they concede many points AronRa hopelessly tries to deny. Of course, their biography on Charles Darwin is also recommended. They unambiguously concede that Social Darwinism is part and parcel of Darwin’s theory and *not* a different idea forced on Darwin’s theory.

“‘Social Darwinism’ is often taken to be something extraneous, an ugly concretion added to the pure Darwinian corpus after the event, tarnishing Darwin’s image. *But his notebooks make plain that competition, free trade, imperialism, racial extermination, and sexual inequality were written into the equation from the start – ‘Darwinism’ was always intended to explain human society*” [Desmond & Moore, 1992, p. xix. My emphasis]

Finally, coming to the last author, Janet Browne. Her two biographical volumes on Darwin are amazing but what matters here is her introduction to Darwin’s *Descent of Man* published by Wordsworth Classics of World Literature in 2013. She, too, notes the racism within Darwin’s works and “there can be no denying the impact of his work in providing a biological backing for notions of racial superiority, reproductive constraints, gendered typologies and class distinctions.” But she insists that you cannot blame Darwin for all the prejudices that appeared after Darwin – fair enough, I agree that that is the best analysis you can ever reach.

In the bibliography, I listed a few more works I did not cite here but I believe are important to read regarding Darwin’s life and racism (though, once again, I disagree with certain points different authors make but nevertheless, minor differences do not negate the evident fact that Darwin was a racist). I also added von L. Trinkwalter’s sociology textbook used in Nazi schools and finally a few articles on eugenics. More could be said but space does not allow that.

Summary

I want to summarise this article by simply reiterating two unassailable facts, which are, that Hitler was an evolutionist and indeed Darwin was a racist. There is no need to rely on evangelical websites whose mission is to defend Darwin instead of the truth.

I wish to end this article on a somewhat better note with a story from Heinrich Heine. I felt happy hearing AronRa speaking of the book burnings the Nazi regime committed in the first half of 1933 (although it is evident he had no idea in which year the event he spoke of occurred. For more information, see Evans, ch. 6; Kershaw, vol 1, ch. 11). In one of the spots where the book burnings took place, in Berlin if I’m not mistaken, a memorial was set up after the collapse of the Nazi regime with Heine’s verse from a play saying,

“Dort, wo man Bücher verbrennt, verbrennt man am Ende auch Menschen”

“Wherever they burn books, in the end will also burn human beings”

Many take these words as some sort of a prediction of the future since those words were written a century before the rise of Nazism, however, it is no prediction. Those words were referring to the past, more specifically, to Andalusia – Muslim Spain. The collapse of Andalusia is, needless to say, a disaster which was followed up by racial extermination and forced conversions at the hands of the Catholics [Carr, 2017], something that even

Darwin admitted though indirectly contradicted his thesis [Darwin, 2013, p. 137 – Darwin was not lamenting at the extermination per se but was lamenting at the fact that the intellectuals were killed at the hands of the Catholics. Yet those who were killed were mainly Muslims, the very people who Darwin associated their mental faculties with that of a dog. Not any dog, but his own dog. [Darwin, 2013, p. 50-51]].

That sentence appears in Heinrich Heine's play *Almansor* which is set in 1492 when the Catholics finally, after centuries of persistent persecution of Jews and Muslims, took over the whole Iberian Peninsula – hence why Catholicism is the major faith in Spain today. The protagonist was Al Mansur (the play is named after him) who had the intention to marry his beloved, Zuleima. Alas, Spain was lost and Zuleima, among others, was captured and forced to convert to Catholicism and then she was forced to marry a Catholic by the name of Don Enrique. The marriage was going to take place at some future period. Amid all the disasters going on in the background, news reached Al Mansur that the Catholics were not only violating the chastity of women, but they were also burning Qurans. That is when the famous quote, "Wherever they burn books, in the end will also burn human beings" appears. Without question, many martyrs were indeed burnt at the stake. [Green, 2007; Baigent & Leigh, 2000]. News also reached him that his beloved was forced into marriage and thus Al Mansur gathered a group of Muslims to attack the Christians at the wedding party and ultimately rescue Zuleima. Mission was successful; Don Enrique was injured; Zuleima lost her consciousness momentarily. Then Al Mansur heroically carries Zuleima between his arms on a high cliff and she regains her consciousness but she believes she is in paradise since she is surrounded by a beautiful landscape – something she allegedly cannot "admire" as Darwin wants you to believe – whilst being carried by her beloved. She said,

"I am in heaven and best of all

Almansor is with me and here in Heaven

You need no deceptive arts

And freely I can declare, I love you

I love you, I love you Almansor!"

Almansur replies,

"I knew it all along, you loved me still

More than you yourself. The Nightingale has

Whispered it, the Rose has laid it upon the scented air,

A breeze has wafted it upon my ear

And every night I read it clear

In the Blue Book with Golden Letters."

She finally replies,

"No! No! The man of piety [Prophet Muhammad] has told no lie

It is so wonderful in this lovely heavenly realm!

Enclose me in your dear arms.

And cradle me upon your soft lap.

And let me, immersed in ecstasy

Rest a thousand years in this Heaven in the Sky!"

I did say I wanted to end the article with Heinrich Heine's story of Almansor but I will end it with one last quote by Heine. Heine, who was a Jew, sent a letter to his friend Moses Moser saying that the Prophet Muhammad was the best poet who no one surpassed and,

"I must admit that you, great Prophet of Mecca, are the greatest Poet and your Qur'an, though I only know it in Boysen's translation, will not easily escape my memory." [Reeves, 2003, pp. 227-8. I thank Abdullah Quilliam for bringing to my attention of Heinrich Heine's alleged conversion to Christianity which Quilliam denounced as a myth Christians try to desperately believe in – "And yet there are thousands of Christians in the British Isles who subscribe large sums of money to support schemes for the Conversion of the Jews! Verily, verily, "a fool and his money are soon parted." See Quilliam, 1893, vol. 1, No. 19].

Appendix

This small table illustrates how Darwin split mankind. The inspiration came from Jahoda's book in which he illustrates how Georges Romanes – who was "Darwin's leading protégé" and metaphorically took Darwin as "his new deity" [Desmond & Moore, 1992, p. 632] – split man and animals in their respective intellectual "developmental phases" [Jahoda, p. 163].

Darwin essentially speaks of two broad human races, savage races near the bottom and civilised races at the top. He constantly compared the two indefinitely. It appears that Darwin uses "savages" & "lowest savages" and "barbarian" & "lowest barbarian" interchangeably, if that is so, then the term "lowest" serves as racial degradation instead of a taxonomic classification.

In chapter two, Darwin ranks the n. Australians as the "lowest savages" [Darwin, 2013, pp. 29 & 48] and the Fuegians as the lowest barbarians – "The Fuegians rank amongst the lowest barbarians...." [Ibid, p. 29. See also Darwin, 1997, p. 412]. Ranking races was not enough, he would even wish that he evolved directly from a "heroic little monkey" instead of a "savage who delights to torture his enemies, offers up bloody sacrifices, practices infanticide without remorse, treats his wives like slaves, knows no decency, and is haunted by the grossest superstitions." Such wild superstitions and xenophobia influenced Darwin's ideas. [Ibid, p. 646]

It must be noted that there could be a possibility that the “barbarians” are higher than the “savages” but for the purpose of simplicity and based on the best of my ability after reading the *Descent*, it appears that the “barbarians” are lower than the “savages”.

Classification	<i>Where to find in Darwin, 2013</i>	<i>How many times it appears</i>
Civilised	19, 20, 29 and more.	55 (in the 2 nd ed. it increased to around 100).
Semi-civilised	72 and 140.	2
Savages	19, 48, 51 and more.	The most repeated term, 64 (in 2 nd ed. it exploded to around 250).
Lowest savages	29, 30, 125 and 180.	4
Barbarians	30, 49, 67 and more.	9 (could be 8 simply because in one instance it seems that Darwin was using it as an insult indirectly towards the Ottomans)
Lowest barbarians	29 and 72.	2
Primeval man (extinct)	42, 44, 74 and more.	9
Semi-human (extinct)	95, 129 and 138.	3

Notes

1. Randal Keynes, who is Darwin’s great great-grandson, wrote in his book *Darwin, His Daughter & Human Evolution* that Charles Darwin wrote a letter to his cousin, William Darwin Fox, in which Darwin “fancied” to live in “the middle states of North America.” [Keynes, p. 118]. However, I could not locate that letter on Darwin Correspondence Project. Nevertheless, if it is true then it is no different to when Darwin fancied to emigrate to Australia. Thus, Darwin desired two most slave-countries to emigrate to; praised colonialism and many more, which blatantly contradicts his statement when he “thanked” God

for not wanting to visit a slave-country. For those two reasons I believe his words in his *Voyage* are at best for public consumption. That does not mean Darwin did not abhor slavery, he certainly did, but only at a minimal level. It would be a historic fallacy to judge an abolitionist of that time with current perceived understanding of an abolitionist.

2. Their claim that Darwin's "humanitarian ideals" were different to the "later" ethnic cleansing policies contradicts Darwin's words of "wonderful progress" and "grand thing". However, they are not wrong that Darwin's belief led to ethnic cleansing, which they already said in their biography of Darwin [1992]. Another meaning to the alleged "humanitarianism" of Darwin is, as they claimed in *Darwin's Sacred Cause*, is that Darwin's abolitionism led to Darwin believing in monogenism – or you could summarise their contention as abolitionism beget monogenism. Therefore, anyone who used Darwin's theory of evolution in the polygenistic way went against Darwin's "humanitarian ideals". However, the evidence of Darwin being led to monogenism by his (minimal) abolitionism is flimsy, hard to believe and has been severely criticised. [Esterson, 2013; Zitzer 2016 and 2017] This is not their first time arguing that abolitionism led to monogenism. In 2004, in their Introduction to the second edition of *Descent of Man* published by Penguin, they repeated that. The usage of morality/emotion as Darwin's driving force to formulate a particular theory was attempted by Randal Keynes in his *Darwin, His Daughter & Human Evolution*. However, both attempts have been unsuccessful. [Ivan Wyhe & Pallen, 2012].

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God, Evolution and Darwinism

"It is beyond doubt that the Darwin was right! Evolution created us – not God." exclaims the speaker. The packed lecture theatre nods in agreement. **"Only ignorant people deny these scientific proofs!"** as he concludes his full day presentation on Darwin's theory of evolution. You have just been shown evidence from anatomy, fossils, embryology, genetics, bioinformatics and biogeography. Supposedly, these proofs are enough to undermine any faith that a rational person had in a creator.

How would you react to this?

Most would simply accept what they are told and just follow the crowd. No one wants to be the odd one out. The idea that Darwin's theory is an unquestionable fact and that God doesn't exist because of the discovery of evolution are popular. You will find these ideas repeated on social media, documentaries, best selling science books and even some well known celebrities pushing this narrative. All people, religious or not, should agree that accepting something without critically analyzing it is blind following, and that is not a good thing.

By reading this article you will learn that there is a big difference between the public and academic understanding of the following three areas:

1. Science leads to certainty

2. Darwin's theory of Evolution is indisputable
3. Darwin's theory of Evolution leads to Atheism

Popularly the statements above are true, however from a purely academic point of view these are false. We will deal with each one of these below.

Claim 1: Science leads to certainty

Although there is a lot of philosophical discussion on what Science is, there is no clear agreement on a precise definition. Nonetheless a basic understanding is that scientists follow the steps below:

Identifying a problem
Construct a hypothesis
Testing the hypothesis by observation and experiment
If the hypothesis fails, go back and amend the hypothesis or discard it and come up with a new hypothesis
If it is successful, publish findings and get other scientists to test it (this is known as peer review)
If the peer review is successful the hypothesis is elevated to the status of a theory

The end product of this scientific process is a theory, this is the highest level of certainty that science can achieve. A common misconception is that a scientific facts or laws are weightier than a theory, but that simply is not the case.

Scientific theories include observations, facts, laws and sometimes mathematical proofs but it is theories that are the real end result of the scientific method. There is obviously more to science than what we have discussed so far, but this is enough to understand the basic elements of the scientific method.

Scientific theories, no matter how successful, can still change because there can always be a new observation that can go against the previous conclusion. Consider a scientist who is trying to figure out what colour swans are and they spend 20 years travelling across the world and document thousands of swans all of which are white. They therefore make the conclusion 'all swans are white'. One day they see a black swan. Their theory that all swans are white is therefore shown to be false. This Black Swan problem (formally known as the problem of induction) is well known within the philosophy of Science and it is the reason why philosophers accept that Science can not give us eternal truths. At any given moment the amount of knowledge scientists have is finite and there is an endless number of things they do not know. Believing this does not make one anti-science, it is just the way things are.

Imagine how much progress we would make if scientists were not allowed to challenge past conclusions: there would be none. Science is not a collection of eternal truths and was never meant to be. Although the general public links Science to truth, philosophers of science do not. This is why many philosophy of Science books give people such warnings:

“Science is revisable. Hence, to talk of scientific ‘proof’ is dangerous, because the term fosters the idea of conclusions that are graven in stone.”

Philosophy of science

Someone may argue not all science changes as we know that fossils of dinosaurs exist, stars exist, water is H₂O, DNA is a code, and no future observation can undermine these hard facts. These facts are *observations* but they aren't science or scientific facts. Something can be considered Science only when through the process of the scientific method observations are used to construct and test hypothesis and theories. Observations in of themselves are not Science, they are just simply, observations. Observations can be used to construct Science, but they can also be used to construct pseudoscience. For example the existence of stars can be used within the legitimate scientific field of astronomy. It can also be used by 'holy men' to make predictions within the field of astrology. Science is much more than just observations. Therefore to claim observations are science would be a category mistake.

Another way it can be claimed that we know Science is giving us truth is because it works. Many philosophers have worked hard to point out that it does not logically follow that just because something works, it is true. The phlogiston theory is an apt example to prove this point. Early chemists postulated the theory that within all combustible objects was a substance called phlogiston. When a combustible object burned, it would release phlogiston. The more combustible a material was, the more phlogiston it contained. The theory worked so well that in 1772 Dan Rutherford used it to explain the discovery of nitrogen. However, phlogiston was later found to be a false theory; phlogiston as a substance did not exist. Another example we get at the beginning of the 20th century, physics looked neat and tidy with its Newtonian model of the universe. No one had challenged it for over 200 years as it was working well and producing fantastic results. However, quantum mechanics and General Relativity shattered the Newtonian view of the world. Newtonian mechanics assumed time and space to be fixed entities, but Albert Einstein showed these were relative and dynamic. Eventually, after a period of upheaval General Relativity replaced the classical Newtonian model of the universe.

These are some of many examples to show that a theory can work and produce astonishing results, and yet later to be found to be false. History of Science is littered with false theories that were once thought to be true because of their predictive success, interestingly as philosophers point out there are cases in which wrong aspects of wrong theories are responsible for novel predictive success. The lesson is obvious: just because something works, it does not mean it is true. This fact has been long recognised by philosophers and historians of Science:

Historically, there are many cases of theories that we now believe to be false but that were empirically quite successful.

History of science

Scientific U-turns do not care about who is sitting in the passenger seat. Even things which seemed obvious, undeniable and taken for granted can be overturned. Every aspect of science, and even the subtheories that make up the bigger theories in every field can revise their conclusions. The history of science has shown us this trend, so to speak of 'scientific facts' as immutable is not accurate. It is also impractical. All scientific theories are

'work in progress' and 'approximate models'. If someone claims there is such a thing as absolute scientific truths, then how would they explain the fact that 'quantum mechanics' and 'general relativity', which are both accepted by physicists, contradict each other at a fundamental level? They both cannot be true in an absolute sense. Knowing this, physicists assume both to be working models and give neither the label of being absolutely true. The idea that 'scientific facts' are final is therefore misleading, impractical and dangerous for scientific progress. Historians and philosophers of science have been vocal in their opposition to use of such language.

Some atheists mock religious scripture for its inability to represent the supposed 'hard truths' of Science. There are many online and offline discussions on science versus religious orthodoxy. However, in light of the discussion above, we have created a false dichotomy of religion versus science. It is not as simple as accepting one over the other. Science is the application of reason to the natural world. It seeks to understand how the world works. The Qur'an also refers to natural phenomena, and inevitably there have been times of convergence and conflicts between the Qur'an and Science. When a conflict does arise, there is no reason to claim the Quran is wrong. To do so would be to assume that scientific conclusions are true in an absolute sense and will not change; this is patently false. History has shown that science revises its conclusions, philosophy shows why it does so. Science does not give us truth rather it gifts us instrumentally useful theories.

If Science conflicts with the Qur'an (after attempting to reconcile the two) it does not mean the Qur'an is wrong and nor does it mean that we should reject the Science. There are good independent arguments to justify the Qur'an's claim of being God's word (see the book *The Eternal Challenge*). So Muslims have reasons to believe what the Quran says is true. Muslims can *accept* the science that conflicts with the Quran (such as aspects of Darwinian evolution) as *the current best-working model*, but understand that it is not true in literal sense. Muslims can accept *all* prevailing scientific theories as working models and at the same time accept the Quran as being true. It is important to note that scientific knowledge and Divine revelation have two different sources. One is from the human limited mind, the other is from God. God has the picture, we have just a pixel of knowledge. Muslims can accept both Science and the Quran as sources of knowledge, however they would not give Science a heavier weight in terms of knowledge than the Quran when a conflict does arise because they have reasons to trust the Quran, and, they know that any scientific theory can be revised.

Interestingly in the last century there was direct contradiction between the Qur'an and Science, and the Science changed to be in line with the Qur'an. Until the 1950s, all physicists, including Einstein, believed that the universe was eternal; all the data supported this, and this belief conflicted with the Qur'an. The Qur'an explicitly states that the universe had a beginning. Those who think science gives us eternal truth may have used this situation to say the Qur'an is wrong and therefore it can't be God's word. However, new observations using powerful advanced telescopes made physicists drop the 'steady state' model (eternal universe) and replace that with the Big Bang Model (universe with a beginning). So, science came into line with the Qur'an. Yet this does not mean that the Qur'an is a book of science nor has it ever claimed to be. It's a book of signs. The Qur'an does not give any details concerning natural phenomena. Most of the things it refers to can be understood and verified with the naked eye. The main objective of the verses that point towards the natural world is to highlight God's power, majesty and wisdom. Their role does not include elucidating scientific details. Science can change over time; however, the fact that natural phenomena have a power and wisdom behind them is a timeless reality. The upshot of all this is that the false dichotomy between the Qur'an and Science that some atheists posit does not work. Quran is not undermined by Science and neither do Muslims undermine Science even if it at times conflicts with their beliefs.

Claim 2: Darwin's theory of Evolution is a fact

The image above of a line of ape like creatures progressively evolving into a human being is one of the most iconic images in the world, it is universally recognized and doesn't even need any captions or translations, if you don't know anything about evolution chances are you have seen this image on an advert and this is probably the way you believe evolution works. Popular as this image is, it is false! This is not the way evolution works, this is actually a misrepresentation of how the theory works. Biologists have long complained about how this popular view of evolutionary progress is simply wrong. Nature is the oldest and most prestigious science journal in the world. Henry Gee is a paleontologist, evolutionary biologist and the senior editor of the Nature. This is what he had to say about this iconic image: ***The idea of human evolution as a tale of inevitable progress is, however, a travesty, and has nothing much to do with Darwin. The bastardized view of evolution that's become so much a part of the general consciousness – so much so that it's so much low-hanging fruit for admen-owes much to Ernst Haeckel, Darwin's number one fan in Germany.***

How does it make it feel that something that most people believe about evolution is wrong? For one you may be feeling a bit curious about what else you thought you knew about evolution that is wrong. That's good because that's what this booklet is about, the aim is give you a paradigm shift in thinking about those things you took for granted. When you are done reading you will learn the significant difference between the way Darwinian Evolution is perceived by the public and the way it is actually understood by academics. On a public level Darwinian Evolution is as true as the fact that the earth goes round the Sun. However academically no biologist or philosopher of science would say this because there are no absolute truths in science. Rather they see it as a valid scientific theory which sits within a probabilistic framework, it has multiple assumptions and there still exists disputes about its core ideas. This isn't the view of a few fringe biologists, all biologists and philosophers of Science would not deny that.

It is important to note at this point that when you hear the arguments like '97% of scientists believe in evolution so it must be true', this is simply misleading. It's true that they believe it, but we need to make clear what this belief is and what it is based upon. It does not mean they believe it to be absolutely true, it means they accept it as a valid scientific theory, that's all. Even the most famous proponent of Darwinian Evolution today, Professor Richard Dawkins does not believe it to be absolutely true:

Darwin may be triumphant at the end of the twentieth century, but we must acknowledge the possibility that new facts may come to light which will force our successors of the twenty-first century to abandon Darwinism or modify it beyond recognition.

Professor Richard Dawkins

The academics referenced below are mainstream secular biologists and philosophers of Science. None of them believes in creationism, intelligent design or anything like that. It is important to highlight this as the impression that many people have is that only religious people criticize evolutionary theory.

Evolution and Darwinism

First thing we need to do is to make a distinction between evolution and Darwin's theory of evolution also known as Darwinism or Neo Darwinism. On a public level these terms are thought to be the same, however academically they are not. So what is the difference? Evolution as a general concept means 'biological change over time'. On the other hand Darwinian evolution has two parts, the history of life being represented by a tree, where all the organisms that have ever lived go back to one common origin and secondly that natural selection is the primary driving mechanism behind all this biological change.

Evolution is a basic observation in nature, we can see it before our very eyes. This basic type of evolution is simply true, it is happening all around us, butterfly populations change biologically over time, bacteria evolve resistance to medicine, fish lose traits that are detrimental over time etc. No one disagrees with this type of biological evolution being ubiquitous and this was well known before Darwin. Even the most primitive human being who has had no interaction with the civilized world would agree that this evolution is an undeniable observation. Darwinian Evolution is way more than this basic observable evolution it claims that all of life evolved from a single cell and all the biological change happened primarily due to natural selection.

Although it is absolutely clear that there is a difference between evolution and Darwinism, the public thinks they are one and the same. This confusion is not inconsequential. This is because people *conflate* this apparent observable evolution with Darwinian Evolution. They think evidence for the former is evidence for the latter and this is simply not true. Darwinian evolution has the twin thesis of the tree of life and natural selection and these require evidence other than the basic observation of evolution itself. Clarifying this distinction is important. So one who claims they are the same and uses this to argue for the truth of Darwinian evolution is actually committing a fallacy of equivocation.

Darwinian evolution is based on a probabilistic framework which has assumptions and importantly there are ongoing disputes and doubts about its central claims.

Probabilistic Framework:

Working out the history of life on earth is a difficult task for two simple reasons. Firstly, we are talking about something that happened a very long time ago. Secondly, there is a worryingly large set of data that is missing. Life has been around for about 4 billion years. 99.999% of all things that ever lived are estimated to be extinct and undiscovered. So whatever picture of the history of life and evolutionary developments that biologists try to make is going to involve probabilities, simplifications and speculations. To get a feel for this problem consider an analogy given in the prestigious scientific journal, *Science*. It compares working out the evolutionary history of human life to working out the plot of Leo Tolstoy's War and Peace with thirteen randomly selected pages! Tolstoy's book is one of the largest literary pieces in the world. If you were given a copy with all the pages blank and only thirteen with writing on it, do you really think that you would be able to come up with an accurate rendition of the major story details, let alone any semblance of details! One can look at the possible evolutionary history of life on earth and come up with a number of differing interpretations such as single origin of life or multiple origins of life, universal common ancestor or multiple common ancestors, gradualism or rapid biological changes, hedge of life or tree of life or bush of life or web of life, whatever interpretation you make can be challenged by another alternative one. Working out the history and development of life is an arduous task. It is impossible to give a definitive answer regarding this. Whatever answer is given today by biologists is at best still probabilistic but they can't say for sure what happened and how it happened.

The Tree of Life is a well recognized symbol of Darwinism. Darwin assumed all of all life came from one cell sometime in the remote past. Slowly and gradually there was branching out of different species in a tree like pattern. You can't open up any book on biology except that the famous Tree of Life is mentioned. Again on a popular level the tree of life is given to be true, yet within academia it is known as just a model. The tree of life is based on the idea of homology. Homology is the assumption that similarities between genes, anatomy and other traits are due to common descent. Once again in public perception homology is thought to be an indisputable conclusion whereas in fact it is only an assumption. No one was around billions of years ago to watch how one species lead to another distant one. Since we only have observed 0.0001% of life on earth any "tree" that is made to show genealogical relationships is tentative at best. Homology as an assumption is challenged by

homoplasy, homoplasy is the observation of similarities in genetic data and anatomy that can not be due to common descent. In other words, even when one builds a tree of life based on the assumption of homology, some similarities can never be due to common descent.

Whether we look at the tree of life as a whole or two branches of species that are supposed to have a common ancestor, we are still dealing with probabilities based on assumptions not hard facts. In the Cambridge university publication 'Evidence and Evolution, the logic behind the Science' it explains:

Both of the following thoughts are therefore naive: humans and chimps must share a common ancestor because they are so similar and humans and mushrooms must have arisen independently because they are so different. There is no must within a probabilistic framework.

Evidence and Evolution, the logic behind the Science

Next we are going to look at some of the many assumptions that the probabilistic framework of Darwinism actually holds.

Assumptions:

There are a number of assumptions that Darwinian evolution is based on upon and many of these are being challenged by new evidence and new interpretations. Below we will cover three assumptions and how they are being challenged.

Gradualism

Darwin assumed evolution takes place in small slight steps: 'steady, slow, and continuous'. This assumption of gradualism is an essential part of Darwin's theory. In fact Darwin made this a as a 'falsification' condition to his entire framework: "If it could be demonstrated that any complex organ existed, which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down. But I can find no such case". Unbeknownst to the general public gradualism has always been controversial among paleontologists yet only in the last couple of decades did some of them come out in the open and express their doubts. Paleontologist Stephen J Gould explains the problem with this assumption: "The history of life is more adequately represented by a picture of 'punctuated equilibria' than by the notion of phyletic gradualism. The history of evolution is not one of stately unfolding, but a story of homeostatic equilibria, disturbed only 'rarely' (i.e. rather often in the fullness of time) by rapid and episodic events of speciation." What Gould is saying here is that while we expect to see slow steady gradual changes in species, the fossil record shows the opposite, rapid changes in biological features. Gould was probably the most vocal public critic of gradualism, but since he came out many more biologists have challenged gradualism.

Horizontal Gene Transfer

Darwinism assumes that genes are only transmitted vertically meaning from parent to offspring. This assumption came under enormous pressure in recent years with the discovery of a process known as Horizontal Gene Transfer (HGT). This is when genes are passed horizontally between species. Initially HGT was assumed to be a minor component of the overall story, transferring only "optional extra" functions such as antibiotic resistance,

core biological functions such as DNA replication and protein synthesis were still thought to be passed on vertically. Surprisingly this view was shown to be wrong, HGT was happening everywhere and is complicating the neat picture Darwinism was trying to paint. Commenting on the way process like HGT have strained the traditional simplistic view of Darwinism, Evolutionary Biologist Michael Rose comments: "The complexity of biology is comparable to quantum mechanics." HGT caught the biological community off guard with some trying to desperately understand it within the Darwinian framework while others just realising that it's not gonna work and we need a new approach.

Selfishness

Darwinism assumes that the only reason for our existence is to selfishly care about our own 'survival and reproduction'. This is the standard Darwinian view of Darwinists today and the first contemporaries of Darwin. Thomas Huxley (known infamously as Darwin's bulldog) argued in *Evolution and Ethics* (1893) that "Life was a continual free fight" for 'survival of the fittest'. Dawkins in a similar vein writes about our selfish genes: "They are in you and in me; they created us, body and mind; and their preservation is the ultimate rationale for our existence."

The obvious problem with this view that Huxley and those after him subscribed to is that human beings are 'hopelessly addicted to altruism'. We care about others for their own sake and don't always act in a selfish way. To try and fix this problem of 'altruism' two theories were put forward; Kin Selection and Reciprocal Altruism. Kin Selection is the evolutionary strategy that favours the reproductive success of an organism's relatives, even at a cost to the organism's own survival and reproduction. The reason for this is that our kin carry our genes, and it is our genes that we want to pass on even at the cost of our own life. The closer the kin, the more genes we share. Biologist J.B.S Haldane put it this way **"I would lay down my life for two brothers or eight cousins"**. Kin selection doesn't explain why we care for non-kin. Darwinists have tried to develop an answer for this too. The theory of 'Reciprocal Altruism' is invoked to explain why we care for others. This theory purports that we are beneficial to others because we know they will return the favor, you scratch my back and I'll scratch yours. In other words as the Evolutionary Biologist George Williams puts it, morality is **"an accidental capability produced, in its boundless stupidity, by a biological process that is normally opposed to the expression of such a capability."** The problem with reciprocal altruism is that it doesn't explain why many people give charity anonymously, why we have governments that collect taxes for hospitals to help the 'survival of the unfittest', why people care about animals, ancient buildings and are willing to die for their values and ideals. Philosopher of Science David Stove in his book *Darwinian Fairytales* challenges these darwinian explanations and argues that they are fundamentally at odds with our nature: **"If you have made that uncomfortable bed, you will just have to lie in it. And one of its minor discomforts is this: that you will have to reconcile yourself to performing, all your life, that evasive trick of which Hume rightly complained. That is, of calling certain facts – namely the facts of human altruism – a "problem" or a "difficulty" for your theory, when anyone not utterly blinded by Darwinism can see that these facts are actually a demonstration of the falsity of your theory.'** Although the vast majority of biologists accept the selfish gene view, nonetheless selfishness as an assumption is being challenged by some biologists and philosophers because it contradicts our moral instincts.

These are some of the assumptions that are being challenged by new evidence or new interpretations. The point of mentioning these assumptions and how they are being challenged is to show the changing nature of scientific ideas and that there is a live discussion going on. Although most biologists accept Darwinism assumptions, others are more critical like the Oxford biologist Denis Noble. He claims:

All the central assumptions of Neo-Darwinism have been disproven. **Denis Noble Oxford biologist**

Noble's view is rare amongst Biologists but the important point to takeaway is that academic criticism of darwinism exists. And this is what one would expect because in science nothing is set in stone.

Disputes:

Another major issue against the idea that Darwinism is true is the existence of disputes within the theory at a conceptual and a philosophical level.

Darwin's central idea was that natural selection is the driving mechanism behind evolution. This was the main thesis of the origin of species. Natural Selection as a creative force is again one of those things the general public thinks of as an indisputable fact. It might come as quite a shock then, that it is not accepted as an immutable truth by all biologists. It is in fact being disputed and challenged.

Award winning Evolutionary Biologist Lynn Margulis explains: **"This is the issue I have with neo-Darwinists: They teach that what is generating novelty is the accumulation of random mutations in DNA, in a direction set by natural selection. If you want bigger eggs, you keep selecting the hens that are laying the biggest eggs, and you get bigger and bigger eggs. But you also get hens with defective feathers and wobbly legs. Natural selection eliminates and maybe maintains, but it doesn't create."** Margulis is one of many biologists who in recent years have been critical of the power of natural selection. In 2016 the oldest and most prestigious science society, the Royal Society of London, gathered influential evolutionary biologists from across the world to discuss this very problem. The biologists were split into two camps. One believed natural selection was, as Darwin said, the driving force of evolution. The other camp strongly disagreed. They went as far as to proposing alternatives that solved problems that Darwinism could not. Here are three of them:

Evolution by Natural Genetic Engineering (ENGs)

According to the standard darwinian theory the randomness of mutations is the clay that natural selection shapes into all sorts of novel species. Though this has been taught and retold in numerous popular publications and documentaries, some evolutionary theorists claim there is lack of evidence that random mutations can make anything useful. James Shapiro is one of the innovative biologists who is challenging this central pillar of Darwinism. Shapiro is using contemporary research in mutations to make a completely new evolutionary paradigm. In *Evolution: A View from the 21st Century* Shapiro explains why Evolution by Natural Genetic Engineering can be a better model than Darwinian Evolution.

Neo Lamarckian Evolution

Although Lamarck was ignored for a long time, in the last couple of years some biologists have started to look back at his ideas and have developed a revised theory known as Neo Lamarckian evolution. Darwinism assumes acquired characteristics can't be inherited, the only thing that is inherited from the parents is their DNA which is fixed and any changes in their children is due to random mutations. So under this assumption if someone has a poor diet this doesn't affect their DNA or their children. Proponents of Neo Lamarckism argue against this. They believe that one's lifestyle does affect the expression of the DNA and their children directly. Neo Lamarckists cite

recent studies to support their view. They propose not only that acquired characteristics can be inherited, but also that these drive some major evolutionary changes.

Mutation Driven Evolution (Mutationism, neo Mutationism)

Mutationism assumes evolution is driven by large mutations not small incremental steps. This mechanism challenges the idea of Darwinian gradualism and natural selection as the main driving force behind evolutionary change. Although Mutationism was discarded decades ago, in recent years

Evolutionary Biologist Masatoshi Nei proposes a rehashed version of Mutationism. Nei is a well known, respected and award winning scientist whose work is widely used in population genetics. His book *Mutation Driven Evolution* shows how developments in molecular biology are challenging the Darwinian predictions and how a new alternative can work. Nei vocally opposes Darwinian hegemony and the unquestionable faith that is placed in it: **"Darwin is a god in evolution, so you can't criticize Darwin. If you do, you're branded as arrogant. But any time a scientific theory is treated like dogma, you have to question it. The dogma of natural selection has existed a long time. Most people have not questioned it. Most textbooks still state this is so. Most students are educated with these books. You have to question dogma. Use common sense. You have to think for yourself, without preconceptions. That is what's important in science."**

It's simply false to assume that all biologists agree with Darwinian evolution, the popular notion that only religiously scientists challenge darwinism is unfounded. In fact there is project set up by academics called 'Third Way of Evolution' in which biologists make it clear that they neither subscribe to Darwinism nor a religiously motivated alternative: **"The vast majority of people believe that there are only two alternative ways to explain the origins of biological diversity. One way is Creationism that depends upon intervention by a divine Creator. That is clearly unscientific because it brings an arbitrary supernatural force into the evolution process. The commonly accepted alternative is Neo-Darwinism, which is clearly naturalistic science but ignores much contemporary molecular evidence and invokes a set of unsupported assumptions about the accidental nature of hereditary variation. Neo-Darwinism ignores important rapid evolutionary processes such as symbiogenesis, horizontal DNA transfer, action of mobile DNA and epigenetic modifications. Moreover, some Neo-Darwinists have elevated Natural Selection into a unique creative force that solves all the difficult evolutionary problems without a real empirical basis. Many scientists today see the need for a deeper and more complete exploration of all aspects of the evolutionary process."** Academics on the 'Third Way of Evolution' include biologists and philosophers from prestigious universities like Oxford, Cambridge, Princeton, MIT, Harvard amongst others.

Clearly there is a valid disagreement in the biological community about the most fundamental parts of Darwin's theory. This does not mean Darwinism is invalid or unscientific It is still the main scientific theory to explain biological change, and also the majority of biologists subscribe to it. Mentioning the disagreements above is done solely to show that Darwinism is not an eternal truth set in stone. Understanding the history and philosophy of science makes these disputes unsurprising. Indeed, difference of opinion is exactly what one would expect from Scientists as they are not supposed to take anything for granted.

Darwinism has two main parts, a history of evolution (Tree of life) and a mechanism of evolution (Natural Selection). Both of these are interdependent. If the mechanism is inadequate, the history is directly challenged. Interestingly although on a public level the mechanism of natural selection is thought of as an immutable truth, academically it is well known that there major issues with it, as the biologist Gerd B. Müller explains: **"A rising number of publications argue for a major revision or even a replacement of the standard theory of**

evolution, indicating that this cannot be dismissed as a minority view but rather is a widespread feeling among scientists and philosophers alike.”

Darwinism may be perceived by the public to be true but this is indefensible academically. It is based on a probabilistic framework which has assumptions and there are disputes about its core ideas. Although it is a valid scientific theory, the claim that Darwinian evolution is absolutely true is patently false.

Claim 3: Darwin's theory of Evolution leads to Atheism

In *The Blind watchmaker*, which is one of the most popular evolutionary books, the Oxford Professor Richard Dawkins explains: **Although atheism might have been *logically* tenable before Darwin, Darwin made it possible to be an intellectually fulfilled atheist.** In another popular book 'The God Delusion' he similarly argues: **“Darwin and his successors have shown how living creatures, with their spectacular statistical improbability and appearance of design, have evolved by slow, gradual degrees from simple beginnings. We can now safely say that the illusion of design in living creatures is just that – an illusion.”** When an average person with no training in biology or philosophy reads these kinds of statements coming from a well known academic, they are likely to simply accept them. As social creatures we like to unquestionably accept what is given to us by those in authority. Dawkins firmly links atheism and darwinism and he is not alone. Millions of people today believe that one leads to the other. Again there is a big gap between the public and the academic understanding of evolutionary science. Dawkins here is stating his personal views on evolution. These aren't the findings of biology but his atheism coloring the biology. Most people mistake statements coming from scientists as scientific statements. This is of course not true. A scientist may hold atheism, theism, agnosticism or any other worldview, and they should be careful not to mix their beliefs with science when talking to the public. There is nothing in Darwin's theory that entails atheism or proves design is an illusion. Dawkins statements are a mixture of oil and water, good biology with bad theology. Philosopher of Biology Elliott Sober, although he is an atheist, gives the correct understanding between the intersection of God and Darwinism: **“Theistic evolutionists can of course be deists, holding that God starts the universe in motion and then forever after declines to intervene. But there is no contradiction in their embracing a more active God whose postCreation interventions fly under the radar of evolutionary biology. Divine intervention isn't part of science, but the theory of evolution does not entail that none occur.”** This shouldn't be a surprise if one understands how Science works. Science uses observations to create and test hypothesis and theories. God by definition is a Being who is unseen. Therefore, any direct observation of Him is impossible. Anyone that claims that God is disproven by anything in Science, whether it's darwinian evolution or quantum mechanics is clearly mistaken. As Hugh Gauch, Philosopher of Science, explains that the idea that **“science supports atheism is to get high marks for enthusiasm but low marks for logic.”** Perhaps one of the reasons that people think that Science leads to atheism is because when scientists give explanations for phenomena, they don't include God as a cause or an active agent, but this does not mean that God doesn't exist. Mechanics can tell you how your car works. they can explain everything including fuel consumption, electrics, gearing system, braking mechanics, air conditioning and so on. While they are giving natural explanations of how the car works. Their explanation does not entail there is no designer of the car. Likewise Scientists only use natural explanations when they set out to give us accounts of how the world works. This is known as methodological naturalism. All scientists are methodological naturalists. This means they only refer to natural causes and natural effects. God is not allowed to be invoked in Science as per the rule of methodological naturalism. but that does not mean God does not exist. Evolutionary biologist Scott Todd highlights this point: **“Even if all the data point to an intelligent designer, such an hypothesis is excluded from science because it is not naturalistic. Of course the scientist, as an individual, is free to embrace a reality that transcends naturalism.”** On the other hand Philosophical naturalism is that idea that nature is all that exists and God does not exist. Methodological naturalism is not the same as Philosophical naturalism. The former does not entail the latter. The confusion is

when these two types of naturalism are conflated. People imagine that since scientists do not refer to God, God does not exist, which is a fallacious thinking. Philosopher of Science Massimo Pigliucci, although he is a proponent of atheism, explains this difference: **“The fallacy lies in the fact that most people—including, alas, prominent science popularizers such as Richard Dawkins—do not make the subtle but crucial distinction between methodological and philosophical naturalism.”** Pigliucci like other philosophers of Science conclude that Science does not demand any commitment to atheism.

Although popularizers like Dawkins promote the idea that Darwinism somehow disproves God Darwin himself would have strongly disagreed! Darwin was never an atheist and it would come as a surprise to him that his theory is being used as an argument for God's non existence, he wrote: **“It seems to me absurd to doubt that a man may be an ardent Theist & an evolutionist.”** Darwin began off as a Christian and then left that to become a deist. Deists hold that God exists but they don't believe in any religion, miracles or life after death. Darwin remained a deist while he was writing his theory and even after he published the Origin of species he was a firm believer in God. In fact in his own autobiography he wrote that not only was it possible to accept fully evolution by natural selection and the existence of God, he also said explicitly that this was the position that he himself held. Later on in life he moved away from belief in God and became agnostic. This change was because of the problem of evil, an issue that always made him uncomfortable. He went through a lot of personal tragedies including the death of his beloved children. Nonetheless he still maintained that his theory did not undermine God. The connection between atheism and Darwin's theory is a missing link, although popular its not something that can be academically justified.

One of the arguments that some atheists try and make is that Darwin was actually an atheist (while pretending to be an agnostic) and he did believe that his theory lead to atheism. They argue that he softened his stance towards God and the implications of his theory due to public pressure. There are three problems with this argument. Firstly there is no evidence that he was an atheist, so this speculation is baseless. Darwin had already renounced Christianity publically and had argued that a literal reading of the Bible could not be correct. So if he took these bold steps why would he hide his atheism? Since he already challenged a conservative victorian society, he had nothing to lose. In fact he publicly disagreed with those people who did use his theory to support atheism,. Secondly, even if he was an atheist and believed his theory leads to atheism, he would be *wrong*. The reason is that Science as mentioned before only deals with observables, so how can a theory based on observations of the natural world disprove the unobservable creator.

Lastly, what we find in Darwin's own personal writings is quite the opposite to what we should expect if he was an atheist. In a letter to his John Fordyce in 1879, just 3 years before his death he wrote: **“What my own views may be is a question of no consequence to any one except myself.— But as you ask, I may state that my judgment often fluctuates. Moreover whether a man deserves to be called a theist depends on the definition of the term: which is much too large a subject for a note. In my most extreme fluctuations I have never been an atheist in the sense of denying the existence of a God.— I think that generally (& more and more so as I grow older) but not always, that an agnostic would be the most correct description of my state of mind.”**

The upshot is that belief in God is not undermined by Darwinian evolution or any other theory in Science. Science itself does not have the capacity to challenge God. This statement is not anti scientific it is simply a matter of fact. In today's world we benefit enormously from scientific achievements. Science has helped us live longer, more comfortably and enriched us with knowledge unknown to previous generations, so science and scientists are often venerated. However they should not be venerated to an extent that we subscribe to Scientism (excessive belief in the power of scientific knowledge). Science is great tool but it has limits and can not do everything. Science is based on upon mathematics and logic, these can not be proven by science as it depends on them to

function. $a^2 + b^2 = c^2$ is used in Scientific theories but Science can not tell us why this mathematical formula is the way it is, Science uses inductive and deductive logic but it can not explain how it is that logic works the way it does. Science can not tell us if giving charity is good or if kicking an animal is bad. Science can't tell us anything about moral facts, aesthetic judgements, metaphysical truths, if historical figures existed or even what to do with scientific knowledge and if it is good to pursue science in the first place! Science also can not tell us why science works, you need philosophy for that.

If we understand Science, how it works, its philosophy, its history we won't fall into the mistake of thinking that science or any product of science such as darwinism can oust God. Understanding of the philosophy of science and of darwinian evolution shows us that the theory is not literally true, although it may be the best naturalistic scientific account that we have at this time.

Summary

There is a difference between the academic and public understanding of Science in general and evolution specifically. The public might imagine that Science gives us truth, yet an academic understanding shows us that nothing in science is "set in stone." Darwinian evolution as a product of science is not therefore, and never could be some sort of eternal truth. Philosophy of Science teaches us that we can always get a new novel observation which can challenge our previous theories and the history of science shows us that many successful theories turned out to be false. Darwin's theory of evolution is a working model; a valid scientific theory, not a fact in the sense of being absolute, certain and unchangeable. Darwin's theory is based on a probabilistic framework, which has assumptions and there are disputes about its core ideas. The popular idea that evolution undermines the existence of God is simply wrong. Science only deals with observable phenomena, God by definition is unobservable. Understanding the philosophical foundations of Science is very important because that is how we get a clearer picture of what Science in fact can and can't do.

Atheists and agnostics should recognise that science does not and cannot negate God. Not only does science not lead to atheism, atheism does not necessarily lead to Science. If someone is an atheist they may choose to or not to pursue scientific knowledge about the natural world. The Islamic tradition has historically been very open to scientific enquiry and for many was and still is a path that leads one closer to God which is rooted in the prime source of Islam, the Quran:

The revelation of this Book is from God—the Almighty, All-Wise. Surely in 'the creation of' the heavens and the earth are signs for the believers. And in your own creation, and whatever living beings He dispersed, are signs for people of sure faith. And 'in' the alternation of the day and the night, the provision sent down from the skies by God—reviving the earth after its death—and the shifting of the winds, are signs for people of understanding. These are God's revelations which We recite to you in truth. So what message will they believe in after 'denying' God and His revelations? The Quran 45:2-6

The purpose of life in Islam is to know God and through that knowing glorify, love and gladly accept the wisdom of Divine guidance into one's life. Through deep thinking about God's creation and studying it to benefit humanity one embarks upon a path of deep insights and profound understandings that engender a sense of gratitude, wonder and awe of the Creator that leaves the one immersed in it complete and filled with noble purpose.

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Qur'an vs Science – whose side are you on?

Darwinian Delusions

[Part 2](#) | [Part 3](#)

Part 1: Should you reinterpret Islam to fit science?

Over the years there have been numerous attacks by Darwinists on the beliefs of theists in general and Muslims in particular. Among the charges they make is that Darwin's theory does away with the need for God, yet we still believe; the story of Adam and Eve is a myth yet we still believe; Islam needs to be discarded or reformed to be in line with Darwinism, yet we still believe!

It is easy to fall for their narrative. Most would simply accept what they are told and just follow the crowd. No one wants to be the odd one out. The idea that Darwin's theory is an unquestionable fact and that God doesn't exist

because of the discovery of evolution are popular. You will find these ideas repeated on social media, in documentaries, best-selling science books and even some well-known celebrities push this narrative. All people, religious or not, should agree that accepting something without critically analysing it is blind following, and that is not a good thing.

By reading this short series you will learn that there is a big difference between the general public and critical, academic understanding of the following three areas:

1. Science leads to certainty;
2. Darwin's theory of evolution is indisputable;
3. Darwin's theory of evolution leads to Atheism.

In popular culture the statements above are seen as true, however from a purely academic point of view these are false. We will deal with each one of these in this series, *inshā'Allāh*.

Claim 1: Science leads to certainty

Although there is a lot of philosophical discussion on what science is, there is no clear agreement on a precise definition. Nonetheless, a basic understanding is that scientists follow a process comprising the steps below:[\[1\]](#)

1. Identifying a problem
2. Constructing a hypothesis
3. Testing the hypothesis by observation and experiment
4. If the hypothesis fails, go back and amend the hypothesis or discard it and come up with a new hypothesis
5. If it is successful, publish findings and get other scientists to test it (this is known as peer review)
6. If the peer review is successful the hypothesis is elevated to the status of a theory

The end product of this scientific process is a theory, this is the highest level of certainty that science can achieve. A common misconception is that scientific facts or laws are weightier than a theory, but that simply is not the case.

Scientific theories use observations, facts, laws and sometimes mathematical proofs, but it is theories that are the real desired end result of the scientific method. There is obviously more to science than what we have discussed so far, but this is enough to understand the basic elements of the scientific method.

Scientific theories, no matter how successful, can still change because there can always be a new observation that can go against the previous conclusion. Consider a scientist who is trying to figure out what colour swans are. They spend 20 years travelling across the world and document thousands of swans all of which are white. They therefore make the conclusion 'all swans are white'. One day they see a black swan. Their theory that all swans are white is therefore shown to be false. This Black Swan problem (formally known as the problem of induction) is a textbook example within the philosophy of science and it is the reason why philosophers accept that science cannot give us eternal truths. At any given moment the amount of knowledge scientists have is finite and there is an endless number of things they do not know. Believing this does not make one anti-science, it is just the way things are.

Imagine how much progress we would make if scientists were not allowed to challenge past conclusions; there would be none. Science is not a collection of eternal truths and was never meant to be. Although the general public links science to truth, philosophers of science do not. This is why many philosophy of science books give people such warnings:

“Science is revisable. Hence, to talk of scientific ‘proof’ is dangerous, because the term fosters the idea of conclusions that are graven in stone.”[\[2\]](#)

Observations vs science

Someone may argue not all science changes as we know that fossils of dinosaurs exist, stars exist, water is H₂O, DNA is a code, and no future observation can undermine these hard facts. These facts are *observations* but they aren’t science or scientific facts per se. Something can be considered science only when through the process of the scientific method observations are used to construct and test hypotheses and theories. Observations in and of themselves are not science, they are just simply, observations. Observations can be used to construct science, but they can also be used to construct pseudoscience. For example, the existence of stars can be used within the legitimate scientific field of astronomy. It can also be used by ‘holy men’ to make predictions within the field of astrology. Science is much more than just observations. Therefore, to claim observations are science would be a category mistake.

But science ‘works’

Another way it can be claimed that we know science is giving us truth is because it works. Many philosophers have worked hard to point out that it does not logically follow that just because something ‘works’, it is true.[\[3\]](#) The phlogiston theory is an apt example to prove this point. Early chemists postulated the theory that within all combustible objects was a substance called phlogiston. When a combustible object burned, it would release phlogiston. The more combustible a material was, the more phlogiston it contained. The theory worked so well that in 1772 Dan Rutherford used it to explain the discovery of nitrogen. However, phlogiston was later found to be a false theory; phlogiston as a substance did not exist.

We get another example at the beginning of the 20th century. Physics looked neat and tidy with its Newtonian model of the universe. No one had challenged it for over 200 years as it was ‘working’ well and producing fantastic results. However, quantum mechanics and General Relativity shattered the Newtonian view of the world. Newtonian mechanics assumed time and space to be fixed entities, for example, but Albert Einstein showed these were relative and dynamic. Eventually, after a period of upheaval General Relativity replaced the classical Newtonian model of the universe.

These are some of many examples to show that a theory can work and produce astonishing results, and yet later be found to be false—to be replaced by another theory, for example. The history of science is littered with false theories that were once thought to be true because of their predictive success. Interestingly philosophers point out that there are cases in which wrong aspects of wrong theories are responsible for novel predictive success. The lesson is obvious: just because something works, it does not mean it is true. This fact has long been recognised by philosophers and historians of science:

“Historically, there are many cases of theories that we now believe to be false but that were empirically quite successful.”[\[4\]](#)

Science is supposed to change

Scientific U-turns do not care about who is sitting in the passenger seat. Even things which seemed obvious, undeniable and taken for granted can be overturned. Every aspect of science, and even the sub-theories that make up the bigger theories in every field can revise their conclusions. The history of science has shown us this

trend, so to speak of 'scientific facts' as immutable is not accurate. It is also impractical. All scientific theories are works in progress and 'approximate models'.

If someone claims there is such a thing as absolute scientific truths, then how would they explain the fact that quantum mechanics and General Relativity, which are both accepted by physicists, contradict each other at a fundamental level? They both cannot be true in an absolute sense. Knowing this, physicists assume both to be working models and give neither the label of being absolutely true. The idea that 'scientific facts' are final is therefore misleading, impractical and dangerous for scientific progress. Historians and philosophers of science have been vocal in their opposition to the use of such language.

Should we change Islam to fit 'science'?

Some atheists mock religious scripture for its inability to represent the supposed 'hard truths' of science. There are many online and offline discussions on science versus religious orthodoxy. However, in light of the discussion above, we have created a false dichotomy of religion versus science. It is not as simple as accepting one over the other. Science is the application of reason to the natural world. It seeks to understand *how* the world works. The Qur'ān also refers to natural phenomena, and inevitably there have been times of convergence and conflicts between the Qur'ān and science.

When a conflict does arise, there is no reason to claim the Qur'ān is wrong. To do so would be to assume that scientific conclusions are true in an absolute sense and will not change; this is patently false. History has shown that science revises its conclusions, philosophy shows why it does so. Science does not give us truth rather it gifts us instrumentally useful theories.

If a scientific theory conflicts with the Qur'ān (after attempting to reconcile the two) it does not mean the Qur'ān is wrong, nor does it mean that we should reject the science. There are good independent arguments to justify the Qur'ān's claim of being God's word (see the book *The Eternal Challenge*, for example). Muslims have reasons to believe what the Qur'ān says is true. Muslims can *accept* the science that conflicts with the Qur'ān (such as aspects of Darwinian evolution) as *the current best-working model*, but understand that it is not true in a literal and absolute sense. Muslims can accept *all* prevailing scientific theories as working models for their respective domains and at the same time accept the Qur'ān as being true.

It is important to note that scientific knowledge and Divine revelation have two different natures. One is from the limited human mind perceiving a limited number of observations, whilst the other is from God. God has the picture, we have just a pixel of knowledge. Muslims can accept both science and the Qur'ān as sources of knowledge, however they would not give a scientific theory a heavier weight in terms of knowledge than the Qur'ān when a conflict does arise because the reasons to trust the Qur'ān are far superior, and, they know that any scientific theory—the pinnacle of scientific output—can be (and more likely *will* be) revised.

An interesting example in the last century where there was a direct contradiction between the Qur'ān and science, showed the science change to be in line with the Qur'ān. Until the 1950s, physicists, including Einstein, believed that the universe was eternal; all the data at the time supported this, and this belief conflicted with the Qur'ān. The Qur'ān explicitly states that this observable creation had a beginning. Those who think science gives us eternal truths may have used this situation to say the Qur'ān is wrong and therefore it cannot be God's word. However, newer observations using more advanced telescopes made physicists drop the 'steady state' model (eternal universe) and replace that with the Big Bang model (universe with a beginning). So, science came into line with the Qur'ān.

Yet, this does not mean that the Qur'ān is a book of science nor has it ever claimed to be. It is a book of signs. The Qur'ān does not give any details concerning natural phenomena. Most of the things it refers to can be understood and verified with the naked eye. The main objective of the verses that point towards the natural world is to make us think and reflect, highlighting God's power, majesty and wisdom. Their role does not include elucidating scientific details.

Science can change over time; however, the fact that natural phenomena have a power and wisdom behind them is a timeless reality. The upshot of all this is that the false dichotomy between the Qur'ān and science that some atheists posit does not work. The Qur'ān is not undermined by science and neither do Muslims undermine science, even if it at times certain theories conflict with their beliefs if taken beyond their domains of utility.

What about interpretations?

It is important to distinguish between conflicts in sources of knowledge per se and conflicts between statements, beliefs, interpretations or conclusions drawn from a source of knowledge. All that we have mentioned above holds true for when a scientific theory conflicts with the Qur'ān in principle, but the actual underlying intellectual principles at play warrant mentioning. It may be imprecise to generalise and say “we take the Qur'ān over science” because the everyday understanding of those two words could mean many different things.

Sometimes, when someone says ‘science’, as mentioned above, they could mean an empirical observation or mathematical deduction, rather than science per se. Likewise, when someone says ‘Qur'ān’, they could mean *their* interpretation of a particular verse, or a conclusion drawn from one, rather than the Qur'ān's intended meanings itself (the process of discovering the intended meanings of the Qur'ān, Usūl al-Tafsīr, is outside the scope of this series).

Therefore, the underlying principle at play is to prioritise that which is known with a higher degree of certainty over that which is known with a lower degree of certainty, when there is a conflict. This applies whether this is from empirical observations or from revelation. Consider the following examples.

1) **An apparent conflict between two conclusions drawn from empirical observations.** You may conclude that your BMW engine, due to its faultless performance over the last 100,000 miles, will go on forever if looked after. This is a conclusion based on one engine running over 100,000 miles. However, this conflicts with a general conclusion known from the experience of millions of engines over perhaps billions of miles, that eventually all mechanical parts are prone to decay and decomposition. In this case, the latter trumps the former in terms of the level of certainty we can give to it.

2) **An apparent conflict between two revealed texts.**^[5] In the Qur'ān, there are countless explicit statements stating with complete unambiguity that God is undeniably One, without partner, utterly and absolutely unique. However, the plural is sometimes used to refer to Him and His actions. In this case, the latter is understood and interpreted to be in line with the former, and the plural is thus intended as a “plural of majesty”.^[6]

3) **A conclusion drawn from revealed texts trumping a conclusion drawn from empirical observation.** The Qur'ān and Sunnah confirm certain facts about the origin of human beings: Ādam (peace be upon him) had no parents; and all human beings are descended from him. On the other hand, a theory of evolution may use empirical observations to draw conclusions contrary to that. The weight of certainty of the former conclusions are far greater than the latter, and the higher certainty conclusion trumps the lower certainty one.

4) **A conclusion drawn from empirical observation trumping a conclusion drawn from a revealed text.** Multiple empirical observations and measurements show us that the earth is spherical, for example (something known by Muslim scholars for centuries^[7]). However, an individual scholar *may* interpret from some non-explicit texts that the earth is flat. In this case, that individual's conclusion is trumped by the conclusion which is known with a higher level of certainty, which so happens to be drawn from empirical observation.

This is why it could be misleading to generalise and say “we take the Qur’ān over science”, because, although it is correct in principle, when talking about them as sources of knowledge per se, it is actually an example of the underlying principle in operation: taking that which is more certain to interpret that which is less certain.^[8] Ultimately both the Qur’ān and observable reality are from Allāh, as manifestations of His will and decree, so it is impossible for there to be a genuine contradiction between conclusions ***known with certainty*** from the two, if understood correctly.

Conclusion

Common beliefs and misconceptions in the public imagination about science providing truth betray a lack of understanding of the intellectual foundations of science itself. Whilst empirical observation is one thing, the pinnacle of science—theory—is a constantly changing working model. Conflicts can never occur actually between two universal truths which are known with certainty; however conflicting theories *can* both be accepted as the best working models within their respective domains (like General Relativity and quantum mechanics).

If there is a genuine conflict between a scientific theory and the Qur’ān, it would be intellectually dishonest and fallacious to overturn that which is known with a higher certainty, due to that which is postulated with a lesser degree of certainty.

In the next article in this series, we will discuss how this applies to Darwin’s theory of evolution, and the difference between the empirically observable fact of evolution, and the various scientific theories that are drawn from it.

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Notes:

^[1] Gauch Jr, H. (2002). Scientific Method in Practice. Cambridge: Cambridge University Press.
doi:10.1017/CBO9780511815034

^[2] Gillian Barker, Philip Kitcher, 2013, Philosophy of Science: A New Introduction. Oxford: Oxford University Press. 2014, p. 17.

[3] Carrier, Martin, What is wrong with the miracle argument?, 1991, Studies in the History and Philosophy of Science, 22(1), 23–36.

[4] Samir Okasha. Philosophy of Science, A Very Short Introduction, 2002 Oxford University Press. P. 77.

[5] The phrase ‘apparent’ is important because there is no genuine conflict between revealed texts that have not been reconciled by scholars.

[6] This methodology is laid out in the Qur’ān itself: *“It is He who has sent down to you, [O Muhammad], the Book; in it are unambiguous verses – they are the foundation of the Book – and others unspecific. As for those in whose hearts is deviation [from truth], they will follow that of it which is unspecific, seeking discord and seeking an interpretation [suitable to them]. And no one knows its [true] interpretation except Allāh. But those firm in knowledge say, “We believe in it. All [of it] is from our Lord.” And no one will be reminded except those of understanding.”* [3:7]

[7] Ibn Taymiyya quotes a unanimous consensus (ijmā’) that the earth and sky around it was a sphere. <https://islamqa.info/en/answers/118698/consensus-that-the-earth-is-round>

[8] It is easy for people to make emotionally charged arguments using Qur’ān or scientific observations, thinking their invoking the source will give power to their specific interpretation or conclusion, but the principles mentioned above—developed by Muslim scholars historically and adopted by the rest of the world—allows us to probe arguments more successfully.

Darwin’s biggest critics are evolutionary biologists

Darwinian Delusions

[Part 1](#) | [Part 3](#)

Part 2: Is Darwin’s Theory of Evolution fact?

This short series probes the differences in understanding between the general public and the academic sphere in the following three claims:

1. Science leads to certainty
2. Darwin’s theory of evolution is indisputable
3. Darwin’s theory of evolution leads to atheism.

In the [previous article](#), we discussed the nature of science itself and critically discussed the question: “Should you reinterpret Islam to fit science?”

In this article, we will discuss the second claim in the list above, propounded by some who do not understand the intellectual foundations of science itself, in light of what scientists in the field themselves actually say.

Claim Two: Darwin's theory of evolution is a fact

The image of a line of ape-like creatures progressively evolving into a human being is one of the most iconic images in the world. This image is universally recognised and does not need any caption. Even if you did not know anything about evolution, you might have seen this image on an advert or some such, and this is probably the way you believe evolution works.

As popular as this image is, it is false! The depiction that the image portrays is not the way that evolution works, and is a gross misrepresentation of the theory of evolution. Biologists have long complained about how this popular view of evolutionary progress is simply wrong. Henry Gee – a palaeontologist, evolutionary biologist, and senior editor of *Nature* (the most prestigious scientific journal in the world) – said with regards to this iconic image:

“The idea of human evolution as a tale of inevitable progress is, however, a travesty, and has nothing much to do with Darwin. The bastardized view of evolution that's become so much a part of the general consciousness—so much so that it's so much low-hanging fruit for admen—owes much to Ernst Haeckel, Darwin's number one fan in Germany.”[\[1\]](#)

How does it make you feel that something that most people believe about evolution is wrong according to evolutionary biologists? You may be feeling a bit curious about what else you thought you knew about evolution is wrong. That is the aim of this article: to provide you with a paradigm shift in your thinking about the things you have taken for granted on this topic. By the end of this article, you will learn the significant difference between the perception of Darwinian evolution by the public and the way it is actually understood by academics.

On a public level, Darwinian evolution is accepted as true as the fact that the Earth goes around the Sun. Yet no biologist or philosopher of science would academically say this, because there are no absolute truths in science. Instead, the concept is seen as a valid scientific theory that sits within a probabilistic framework. It has multiple assumptions, and there still exist disputes about its core ideas. This is not the view of a few fringe biologists – no biologist or philosopher of science would deny this.

It is important to note at this point that arguments such as “97% of scientists believe in evolution so it must be true” are simply misleading.[\[2\]](#) It may be true that scientists believe it, but we need to make clear the essence of this belief and its basis. This does not mean that scientists believe it to be absolutely true; it means they accept it as a valid scientific theory – that is all. Even the most famous proponent of Darwinian evolution today, Professor Richard Dawkins, does not believe it to be absolutely true:

“Darwin may be triumphant at the end of the twentieth century, but we must acknowledge the possibility that new facts may come to light which will force our successors of the twenty-first century to abandon Darwinism or modify it beyond recognition.”[\[3\]](#)

The academics referenced below are mainstream secular biologists and philosophers of science. None of them believe in creationism, intelligent design, or anything of the sort. It is important to highlight this, as the impression that many people have is that only religious people criticise evolutionary theory.

Evolution and Darwinism

The first thing that needs to be done is to distinguish between evolution and Darwin's theory of evolution (also known as Darwinism or neo-Darwinism). On a public level, these terms are thought to be the same, but academically they are not.

So what is the difference? Evolution, as a general concept, means biological change over time. On the other hand, Darwinian evolution has two parts: firstly, the history of life being represented by a tree where all the organisms that have ever lived go back to one common origin, and secondly, that natural selection is the primary driving mechanism behind all this biological change.

Evolution is a basic observation in nature, and one we can see before our very eyes. This basic type of evolution is true and happens all around us: butterfly populations change biologically over time, bacteria become resistant to medicine, fish lose traits that are detrimental over time, and so on. No one disagrees with this type of biological evolution being ubiquitous, and this was well known before Darwin. Even the most primitive human being who has had no interaction with the civilised world would agree that this evolution is an undeniable observation.

Darwinian evolution, on the other hand, claims to be more than this basic observable evolution. According to Darwinian evolution, all of life evolved from a single cell, and all biological change has happened primarily due to natural selection.

Although it is absolutely clear that there is a difference between evolution and Darwinism, much of the general public thinks they are one and the same. This confusion is not inconsequential. This is because people *conflate* this apparent observable evolution with Darwinian evolution. They think that evidence for the former is evidence for the latter. This is simply not true. Darwinian evolution has the twin thesis of the tree of life and natural selection, which both require evidence other than the basic observation of evolution itself. This distinction is important to clarify, so claiming that they are the same and using this to argue for the truth of Darwinian evolution is to commit a fallacy of equivocation.

Darwinian evolution is based on a probabilistic framework that has assumptions, and it is important to note that there are ongoing disputes and doubts about its central claims.

Probabilistic Framework

Working out the history of life on earth is a difficult task for two simple reasons: life first began a very long time ago, and there is a worryingly large set of data that is missing. While life has been around on Earth for about four billion years, 99.999% of all things that ever lived are estimated to be extinct and undiscovered.^[4] The picture of the history of life and evolutionary developments that biologists try to create involve probabilities, simplifications, and speculations.

To get a feel for this problem, consider an analogy presented in the prestigious scientific journal *Science*. It compares working out the evolutionary history of human life to working out the plot of Leo Tolstoy's *War and*

Peace using thirteen randomly selected pages from the novel! Tolstoy's book is one of the largest literary pieces ever published. If you were given a copy of the book with all the pages blank and only thirteen with writing on it, do you really think you would be able to come up with an accurate rendition of the major plot points, let alone any semblance of their details?

One can look at the possible evolutionary history of life on Earth and come up with a number of differing interpretations – a single or multiple origins of life; a universal or multiple common ancestors; gradualism or rapid biological changes; the hedge or tree or bush or web of life. Whatever interpretation you make can be challenged by an alternative one. Working out the history and development of life is an arduous task, and it is impossible to give a definitive answer. Whatever answer is given today by biologists is at best still probabilistic, but they cannot say for sure what happened and how it happened.

The tree of life is a well-recognised symbol of Darwinism. Darwin assumed that all of life came from one cell sometime in the remote past. This was followed by a gradual branching out of different species in a tree-like pattern. Open up any book on biology and you will see the famous tree of life mentioned. On a popular level, the tree of life is given to be true, yet within academia, it is known as just a model. The tree of life is based on the idea of homology, which is the assumption that similarities between genes, anatomy, and other traits are due to common descent.

Once again, in the public perception, homology is thought to be an indisputable conclusion, whereas in fact it is only an assumption. No one was around billions of years ago to watch how one species led to another distant one. Since we only have observed 0.0001% of life on Earth, any 'tree' that is made to show genealogical relationships is tentative at best. Homology as an assumption is challenged by homoplasy, which is the observation of similarities in genetic data and anatomy that cannot be due to common descent. In other words, even when one builds a tree of life based on the assumption of homology, some similarities can never be due to common descent.

Whether we look at the tree of life as a whole or as two branches of species that have a common ancestor, we are still dealing with probabilities based on assumptions, and not hard facts. In his book *Evidence and Evolution: The Logic Behind The Science*, Professor Elliott Sober explains:

Both of the following thoughts are therefore naive: humans and chimps must share a common ancestor because they are so similar and humans and mushrooms must have arisen independently because they are so different. There is no must within a probabilistic framework.[\[5\]](#)

We will now outline some of the many assumptions that the probabilistic framework of Darwinism holds.

Assumptions

There are a number of assumptions that Darwinian evolution is based on upon, and many of these are being challenged by new evidence and interpretations. We will cover three assumptions and how they are being challenged.

Gradualism

Darwin assumed evolution takes place in small steps: “steady, slow, and continuous”.^[6] This assumption of gradualism is an essential part of Darwin’s theory. In fact, Darwin made this a ‘falsification’ condition to his entire framework:

“If it could be demonstrated that any complex organ existed, which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down. But I can find no such case.”

Unbeknownst to the general public, gradualism has always been controversial among palaeontologists, yet only in the last couple of decades did some come out in the open and express their doubts. The palaeontologist Stephen J Gould explains the problem with this assumption:

“The history of life is more adequately represented by a picture of ‘punctuated equilibria’ than by the notion of phyletic gradualism. The history of evolution is not one of stately unfolding, but a story of homeostatic equilibria, disturbed only ‘rarely’ (i.e. rather often in the fullness of time) by rapid and episodic events of speciation.”^[7]

Gould states that while we expect to see steady and gradual changes in species, the fossil record shows the opposite, namely, rapid changes in biological features. Gould was probably the most vocal public critic of gradualism, but since his statement, many more biologists have challenged gradualism.

Horizontal Gene Transfer (HGT)

Darwinism assumes that genes are only transmitted vertically (i.e. from parent to offspring). This assumption came under enormous pressure in recent years with the discovery of a process known as HGT, which is when genes are passed horizontally between species. Initially, HGT was assumed to be a minor component of the overall story, transferring only ‘optional extra’ functions such as antibiotic resistance. Core biological functions such as DNA replication and protein synthesis were still thought to be passed vertically.

Surprisingly, this view was shown to be wrong. HGT was happening everywhere and was complicating the neat picture that Darwinism was trying to paint. Commenting on the way that processes such as HGT have strained the traditional simplistic view of Darwinism, the evolutionary biologist Michael Rose comments: “The complexity of biology is comparable to quantum mechanics.” HGT caught the biological community off guard, with some trying to desperately understand it within the Darwinian framework, while others realised that this was not going to work and that they needed a new approach.

Selfishness

Darwinism assumes that the only reason for our existence is to selfishly care about our own ‘survival and reproduction’. This is the standard view of Darwinists today, as well as that of the first contemporaries of Darwin. Thomas Huxley (infamously known as Darwin’s bulldog) argued in his 1893 work *Evolution and Ethics* that life was a “continual free fight” for “survival of the fittest”.^[8]

In a similar vein, Dawkins writes about the selfish gene:

“They are in you and in me; they created us, body and mind; and their preservation is the ultimate rationale for our existence.”

The obvious problem with this view of Huxley and those after him is that human beings are hopelessly addicted to altruism. We care about others for their own sake, and we do not always act in a selfish way. To try and fix this problem of ‘altruism’, two theories have been put forward: kin selection and reciprocal altruism.

Kin selection is the evolutionary strategy that favours the reproductive success of an organism’s relatives, even at a cost to the organism’s own survival and reproduction. The reason for this is that our kin carry our genes, and it is our genes that we want to pass on even at the cost of our own lives. The closer the kin, the more genes we share. The biologist J.B.S. Haldane put it this way: “I would lay down my life for two brothers or eight cousins.”[\[9\]](#)

Kin selection does not explain why we care for those who are not our kin. Darwinists have tried to develop an answer for this too through the theory of reciprocal altruism, which is invoked to explain why we care for others. This theory purports that we are beneficial to others because we know they will return the favour; you scratch my back, I’ll scratch yours. The evolutionary biologist George Williams put it in other words by saying that morality is “an accidental capability produced, in its boundless stupidity, by a biological process that is normally opposed to the expression of such a capability.”[\[10\]](#)

The problem with reciprocal altruism is that it does not explain why many people give charity anonymously, why we have governments that collect taxes for hospitals to help the ‘survival of the most unfit’, why people care about animals and ancient buildings, and why some are willing to die for their values and ideals. In his book *Darwinian Fairytales*, the philosopher of science David Strobe challenges these Darwinian explanations and argues that they are fundamentally at odds with our nature:

“If you have made that uncomfortable bed, you will just have to lie in it. And one of its minor discomforts is this: that you will have to reconcile yourself to performing, all your life, that evasive trick of which Hume rightly complained. That is, of calling certain facts – namely the facts of human altruism – a ‘problem’ or a ‘difficulty’ for your theory, when anyone not utterly blinded by Darwinism can see that these facts are actually a demonstration of the falsity of your theory.”[\[11\]](#)

Although the vast majority of biologists accept the selfish gene view, selfishness is nonetheless an assumption that is being challenged by some biologists and philosophers because it contradicts the vast and varied observations of our moral instincts.

These are some of the assumptions that are being challenged by new evidence and interpretations. The point of mentioning these assumptions and their challenges is to show the ever-changing nature of scientific ideas, and that there is always a live discussion going on. Although most biologists accept many of the assumptions of Darwinism, others are more critical. The important point to take away is that academic criticism of Darwinism exists – this is what one would expect, because in science, nothing is set in stone.

Disputes

Another major issue against the idea that Darwinism is true is the existence of disputes within the theory at a conceptual and philosophical level.

Darwin's central idea was that natural selection is the driving mechanism behind evolution. This was the main thesis of the origin of species. Natural selection as a creative force is, again, one of those things that the general public thinks of as an indisputable fact. It might come as quite a shock that it is not accepted as an immutable truth by all biologists. It is, in fact, being disputed and challenged.

The award-winning evolutionary biologist Lynn Margulis explains:

“This is the issue I have with neo-Darwinists: They teach that what is generating novelty is the accumulation of random mutations in DNA, in a direction set by natural selection. If you want bigger eggs, you keep selecting the hens that are laying the biggest eggs, and you get bigger and bigger eggs. But you also get hens with defective feathers and wobbly legs. Natural selection eliminates and maybe maintains, but it doesn't create.”[\[12\]](#)

Margulis is one of many biologists who in recent years have been critical of the power of natural selection. In 2016, the Royal Society of London (the oldest and most prestigious science society) gathered influential evolutionary biologists from across the world to discuss this very problem. The biologists were split into two camps: one camp believed natural selection was, as Darwin said, the driving force of evolution, while the other camp strongly disagreed. The latter group went as far as to proposing alternatives that solved problems that Darwinism could not. The following is three of these alternatives:

Evolution by Natural Genetic Engineering (NGS)

According to standard Darwinian theory, the randomness of mutations is the clay that natural selection shapes into all sorts of novel species. Though this has been taught and retold in numerous publications and documentaries, some evolutionary theorists claim there is a lack of evidence that random mutations can make anything useful. James Shapiro, one of the innovative biologists challenging this central pillar of Darwinism, uses contemporary research in mutations to propose a completely new evolutionary paradigm. In *Evolution: A View from the 21st Century*, Shapiro explains why NGS can be a better model than Darwinian evolution.

Neo-Lamarckian Evolution

Although the biologist Jean-Baptiste Lamarck was ignored for a long time, some biologists have started to look back at his ideas in the last couple of years and have developed a revised theory known as neo-Lamarckian evolution. Darwinism assumes that acquired characteristics cannot be inherited – the only thing that is inherited from the parents is their DNA, which is fixed, and any change in their children is due to random mutations. Under this assumption, the fact that someone has a poor diet does not affect their DNA or their children. However, this was posited long before the mechanics of inheritance (i.e. genes and DNA) was understood.

Proponents of neo-Lamarckism argue against this based on what we now can observe about the way DNA expression is affected by an organism's environment and behaviour. An entire field of scientific research called epigenetics is dedicated to this. Neo-Lamarckism posits that one's lifestyle does indeed affect the expression of DNA, as well as children, directly. Proponents of neo-Lamarckism cite many recent studies to support their view. They propose that acquired characteristics can not only be inherited, but that they can also drive some major evolutionary changes.[\[13\]](#)

Mutation-Driven Evolution (Mutationism, Neo-Mutationism)

Mutationism assumes that evolution is driven not by small and incremental steps, but by large mutations. This mechanism challenges the idea of Darwinian gradualism and natural selection being the main driving force behind evolutionary change. Although mutationism was discarded decades ago, it has gained traction in recent years.

The evolutionary biologist Masatoshi Nei proposes a rehashed version of mutationism. Nei is a respected and award-winning scientist whose work is widely used in population genetics. His book *Mutation-Driven Evolution* details how developments in molecular biology are challenging Darwinian predictions and how a new alternative can work. Nei vocally opposes Darwinian hegemony and the unquestionable faith that is placed in it:

“Darwin is a god in evolution, so you can’t criticize Darwin. If you do, you’re branded as arrogant. But any time a scientific theory is treated like dogma, you have to question it. The dogma of natural selection has existed a long time. Most people have not questioned it. Most textbooks still state this is so. Most students are educated with these books. You have to question dogma. Use common sense. You have to think for yourself, without preconceptions. That is what’s important in science.”[\[14\]](#)

It is simply false to assume that all biologists agree with Darwinian evolution. The popular notion that only religious scientists challenge Darwinism is unfounded. In fact, there is a project set up by academics called the ‘Third Way of Evolution’ in which biologists make it clear that they neither subscribe to Darwinism nor a religiously motivated alternative:

“The vast majority of people believe that there are only two alternative ways to explain the origins of biological diversity. One way is Creationism that depends upon intervention by a divine Creator. That is clearly unscientific because it brings an arbitrary supernatural force into the evolution process. The commonly accepted alternative is Neo-Darwinism, which is clearly naturalistic science but ignores much contemporary molecular evidence and invokes a set of unsupported assumptions about the accidental nature of hereditary variation. Neo-Darwinism ignores important rapid evolutionary processes such as symbiogenesis, horizontal DNA transfer, action of mobile DNA and epigenetic modifications. Moreover, some Neo-Darwinists have

elevated Natural Selection into a unique creative force that solves all the difficult evolutionary problems without a real empirical basis. Many scientists today see the need for a deeper and more complete exploration of all aspects of the evolutionary process.”^[15]

Academics who are part of the ‘Third Way of Evolution’ include biologists and philosophers from prestigious universities such as Oxford, Cambridge, Princeton, MIT, and Harvard, amongst others.

Clearly, there is valid disagreement in the biological community about the most fundamental parts of Darwin's theory. This does not mean that Darwinism is invalid or unscientific. It is still the main scientific theory used to explain biological change, and the majority of biologists subscribe to it. Discussing the disagreements mentioned above is done solely to show that Darwinism is not an eternal truth set in stone. Understanding the history and philosophy of science makes these disputes unsurprising. Indeed, difference of opinion is exactly what one would expect from scientists, as they are not supposed to take anything for granted.

Darwinism has two main parts: a history of evolution (tree of life) and a mechanism of evolution (natural selection). Both of these are interdependent. If the mechanism is inadequate, the history is directly challenged. Although the mechanism of natural selection is thought of as an immutable truth on a public level, it is well known academically that it contains major issues, as the biologist Gerd B. Müller explains:

“A rising number of publications argue for a major revision or even a replacement of the standard theory of evolution, indicating that this cannot be dismissed as a minority view but rather is a widespread feeling among scientists and philosophers alike.”^[16]

Darwinism may be perceived by the public to be true, but this is indefensible academically. It is based on a probabilistic framework that has assumptions, and there are disputes about its core ideas. Although Darwinian evolution is a valid scientific theory, the claim that it is absolutely true is patently false.

In the third and final article in this series, we will deal with the third claim: Darwin's theory of evolution leads to atheism.

Notes:

^[1] Henry Gee, *The Accidental Species*, 2013, University of Chicago Press; Reprint edition, p14

^[2] <http://www.people-press.org/files/legacy-pdf/528.pdf>

^[3] Richard Dawkins, *A Devil's Chaplain*, Mariner Books, 2003, p81

^[4] https://www.nsf.gov/news/news_summ.jsp?cntn_id=138446

^[5] Elliot Sober, *Evidence and Evolution*, 2003, Cambridge University Press, p296-297

^[6] Charles Darwin, *The Origin of Species*, 1859, p189

[7] Stephen J Gould, Niles Eldredge, Punctuated Equilibria 1972, p82

[8] Thomas Huxley, Evolution and Ethics, 1893, p326

[9] Kevin Connolly and Margaret Martlew, 1999. "Altruism". Psychologically Speaking: A Book of Quotations. BPS Books. p10

[10] George C Williams, Reply to comments on Huxley's Evolution and Ethics in Sociobiological Perspective. 1988, Zygon 23 (4): 437–438

[11] David Stove, Darwinian Fairytales, Encounter Books, 1996, p114

[12] [Http://discovermagazine.com/2011/apr/16-interview-lynn-margulis-not-controversial-right](http://discovermagazine.com/2011/apr/16-interview-lynn-margulis-not-controversial-right)

[13] Eva Jablonka, Transformations of Lamarckism, 2011, The MIT Press

[14] <https://www.discovermagazine.com/the-sciences/mutation-not-natural-selection-drives-evolution>

[15] <https://www.thethirdwayofevolution.com/>

[16] Gerd B Müller, Why an extended evolutionary synthesis is necessary, 2017, Interface Focus, <http://doi.org/10.1098/rsfs.2017.0015>

Evolution Lends No Weight To Atheism

Darwinian Delusions

[Part 1](#) | [Part 2](#)

Part 3: Does Darwin's Theory of Evolution Lead to Atheism?

This short series probes the differences in understanding between the general public and the academic sphere in the following three claims:

1. Science leads to certainty
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3. Darwin's theory of evolution leads to atheism.

In the [first article](#), we discussed the nature of science itself and the fallacy of reinterpreting Islam to follow it. In the [second article](#) we analysed some of Darwinian evolution's biggest criticisms—which happen to be from evolutionary biologists.

In this article, we will discuss the third claim in the list above, propounded by some who do not understand the intellectual foundations of science itself, in light of what evolutionary biologists and atheist thinkers themselves say.

Claim 3: Darwin's theory of evolution leads to atheism

In *The Blind Watchmaker*, one of the most popular books on evolution, Richard Dawkins writes:

“Although atheism might have been *logically* tenable before Darwin, Darwin made it possible to be an intellectually fulfilled atheist.”[\[1\]](#)

When the average person with no training in biology or philosophy reads this statement from a well-known academic, they are likely to simply accept it. As social creatures, we like to unquestionably accept what is given to us by those in apparent authority. Through the above statement, Dawkins firmly links atheism and Darwinism, and he is not alone. Millions of people today believe that one leads to the other.

Yet again, there is a large gap between the public and the academic understanding of evolutionary science. Dawkins here is stating his personal views on evolution, which are not the findings of biology, but instead his atheism colouring the biology. Most people mistake statements coming from scientists as scientific statements. This is, of course, not true. A scientist may have a worldview of atheism, theism, agnosticism, or any other -ism. However, they should be careful not to mix their beliefs with science when talking to the public. There is nothing in Darwin's theory that entails atheism or proves that design is an illusion. The above statement by Dawkins is a mixture of oil and water – good biology with bad theology.

Despite being an atheist, the philosopher of biology Elliott Sober gives the correct understanding between the intersection of God and Darwinism:

“Theistic evolutionists can of course be deists, holding that God starts the universe in motion and then forever after declines to intervene. But there is no contradiction in their embracing a more active God whose post-Creation interventions fly under the radar of evolutionary biology. Divine intervention isn't part of science, but the theory of evolution does not entail that none occur.”[\[2\]](#)

This should not come as a surprise if one understands how science works. Science uses observations to create and test hypotheses and theories. By definition, God is a unseen Being, so any direct observation of Him is impossible. Anyone that claims that God is disproven by anything in science – whether through Darwinian evolution or quantum mechanics – is clearly mistaken. As the philosopher of science Hugh Gauch explains, the idea that “science supports atheism is to get high marks for enthusiasm but low marks for logic.”[\[3\]](#)

Perhaps one of the reasons that people think that science leads to atheism is because scientists do not include God as a cause or an active agent when they provide explanations for natural phenomena. However, this does not mean that God does not exist. Mechanics can tell you how your car works and can explain the fuel consumption, electronics, gearing system, braking mechanics, air conditioning, and other mechanical aspects of

your car. While these are natural explanations of how the car works, it does not entail that the car has no designer. Likewise, scientists use natural explanations when they set out to give us accounts of how the world works. This is known as methodological naturalism.

All scientists are methodological naturalists when doing science. This means that they only refer to 'natural' causes and natural effects. God is not allowed to be invoked in science as per the rule of methodological naturalism, but this does not mean that God does not exist. The evolutionary biologist Scott Todd highlights this point:

“Even if all the data point to an intelligent designer, such a hypothesis is excluded from science because it is not naturalistic. Of course the scientist, as an individual, is free to embrace a reality that transcends naturalism.”[\[4\]](#)

On the other hand, philosophical naturalism is the idea that nature is all that exists and God does not exist. Methodological naturalism is not the same as philosophical naturalism; the former does not entail the latter. The confusion is when these two types of naturalism are conflated. People imagine that since scientists do not refer to God, God does not exist. This is fallacious thinking.

Despite being a proponent of atheism, the philosopher of science Massimo Pigliucci explains this difference:

“The fallacy lies in the fact that most people—including, alas, prominent science popularizers such as Richard Dawkins—do not make the subtle but crucial distinction between methodological and philosophical naturalism.”[\[5\]](#)

Pigliucci, like other philosophers of science, conclude that science does not demand any commitment to atheism.

Although popularisers like Dawkins promote the idea that Darwinism somehow disproves God, Darwin himself would have strongly disagreed! Darwin was never an atheist, and it would come as a surprise to him that his theory is being used as an argument for God's non-existence. Darwin wrote:

“It seems to me absurd to doubt that a man may be an ardent Theist & an evolutionist.”[\[6\]](#)

Darwin was initially a Christian before becoming a deist. Deists believe that God exists, but they do not believe in any religion, miracles, or life after death. Darwin remained a deist while writing his theory of evolution. Even after he published *On the Origin of Species*, he was a firm believer in God.

In fact, in his own autobiography, Darwin wrote that not only was it possible to fully accept evolution by natural selection and the existence of God, but that this was the position that he himself held. Later on in life, Darwin moved away from belief in God and became agnostic. This change was because of the problem of evil, an issue that always made him uncomfortable. He went through many personal tragedies, including the death of his beloved children. Nevertheless, he still maintained that his theory did not undermine God. The connection between atheism and Darwin's theory is a missing link, and although popular, it is not something that can be academically justified.

Some atheists argue that Darwin was actually an atheist pretending to be an agnostic, and that he did believe that his theory leads to atheism. These atheists argue that Darwin softened his stance towards God and the implications of his theory due to public pressure. There are three problems with this argument.

Firstly, there is no evidence that Darwin was an atheist, so this speculation is simply baseless. Darwin had already renounced Christianity publicly and had argued that a literal reading of the Bible could not be correct. If he took such bold steps, why would he hide his atheism? Since he already challenged a conservative Victorian society, he had nothing to lose. In fact, he publicly disagreed with those who used his theory to support atheism at his time.

Secondly, even if he was an atheist and believed his theory leads to atheism, he would be *wrong*. This is because science, as we have mentioned, only deals with observables. How can a theory based on observations of the natural world disprove the unobservable Creator?

Lastly, what we find in Darwin's personal writings is quite the opposite to what we would expect if he was an atheist. In a letter to John Fordyce in 1879, only three years before his death, Darwin wrote:

“What my own views may be is a question of no consequence to any one except myself.— But as you ask, I may state that my judgment often fluctuates. Moreover whether a man deserves to be called a theist depends on the definition of the term: which is much too large a subject for a note. In my most extreme fluctuations I have never been an atheist in the sense of denying the existence of a God.— I think that generally (& more and more so as I grow older) but not always, that an agnostic would be the most correct description of my state of mind.”[\[7\]](#)

The upshot is that belief in God is not undermined by Darwinian evolution or any other theory in science, which itself does not have the capacity to challenge God. This statement is not anti-science – it is simply a matter of fact. In today's world, we benefit enormously from scientific achievements that have helped us to live longer and more comfortably. Science has enriched us with knowledge unknown to previous generations, so science and scientists are often venerated. However, they should not be venerated to the extent that we subscribe to scientism (excessive belief in the power of scientific knowledge). Science is a great tool, but it has limits and cannot do everything. Science is based on mathematics and logic, which cannot be proven by science as it depends on them to function.

Science cannot tell us why the Pythagorean theorem $a^2 + b^2 = c^2$ is the way it is. Science uses inductive and deductive logic, but it cannot explain how it is that logic works the way it does. Science cannot tell us if giving charity is good or if kicking an animal is bad. Science cannot tell us anything about moral facts, aesthetic judgements, metaphysical truths, whether historical figures existed, or even what to do with scientific knowledge and if it is good to pursue science in the first place! Science also cannot tell us why science works – you need philosophy for that.

If we understand science and how it works, together with its philosophy and history, we will not fall into the mistake of thinking that science – or any product of science such as Darwinism – can oust God. An

understanding of the philosophy of science and of Darwinian evolution shows us that the theory of evolution is not literally true, although it may be the best naturalistic and scientific account that we have at this time.

Summary

There is a difference between the academic and public understanding of science generally, and evolution specifically. The public might imagine that science gives us the truth, yet an academic understanding shows us that nothing in science is set in stone. Darwinian evolution as a product of science is not (and could never be) eternal truth. The philosophy of science teaches us that we can always gain a new observation that can challenge our previous theories, while the history of science shows us that many successful theories in the past have since been disproven.

Darwin's theory of evolution is a working model. It is a valid scientific theory, not a fact in the sense of being absolute, certain, and unchangeable. Darwin's theory is based on a probabilistic framework, which has assumptions, and there are disputes about its core ideas. The popular idea that evolution undermines the existence of God is simply wrong. Science only deals with observable phenomena, and God by definition is unobservable. Understanding the philosophical foundations of science is very important because that is how we get a clearer picture of what science can and cannot do.

Atheists and agnostics should recognise that science does not (and cannot) negate God. Not only does science not lead to atheism, but atheism does not necessarily lead to science. An atheist may choose whether or not to pursue scientific knowledge about the natural world. The Islamic tradition has historically not just been very open to scientific enquiry, but made significant contributions to the sciences and the scientific method itself (which will be the subject of a future article, God willing). For many people, it was (and still is) a path that leads one closer to God – a path rooted in the prime source of Islam: the Qur'ān.

“The revelation of this Book is from God—the Almighty, All-Wise. Surely in [the creation of] the heavens and the earth are signs for the believers. And in your own creation, and whatever living beings He dispersed, are signs for people of sure faith. And [in] the alternation of the day and the night, the provision sent down from the skies by God—reviving the earth after its death—and the shifting of the winds, are signs for people of understanding. These are God's revelations which We recite to you in truth. So what message will they believe in after [denying] God and His revelations?” [\[8\]](#)

In Islam, the purpose of life is to know God. Through this, one can glorify, love, and gladly accept the wisdom of Divine guidance into one's life. Through deep thinking about God's creation and studying it to benefit humanity, one embarks on a path of deep insight and profound understanding that evokes a sense of gratitude, wonder, and awe of the Creator that leaves the one immersed in it complete and filled with noble purpose.

The question, “Should we change Islam to fit with Darwinism?” is therefore replaced with, “Why should we change a timeless truth to fit an evolving theory?”

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Notes:

[1] Richard Dawkins, The Blind Watchmaker, 1986, Norton,p6

[2] Elliott Sober, Evolution without Naturalism. 2011, Oxford Studies in Philosophy of Religion. p11

[3] Hugh G. Gauch, Jr. Scientific Method in Brief. 2012, Cambridge University Press. p. 98.

[4] Scott C Todd, correspondence to Nature 401(6752):423, 1999

[5] Massimo Pigliucci, Science and Society, 2005, Science and Fundamentalism

[6] <https://www.darwinproject.ac.uk/letter/DCP-LETT-12041.xml>

[7] <https://www.darwinproject.ac.uk/letter/DCP-LETT-12041.xml>

[8] Al-Qur'ān 45:2-6

Defending Darwin from Hoodbhoy – Response to ‘Corona — our debt to Darwin’

News of a heart-warming exchange between a Pakistani air traffic controller and Air India made headlines this week. Indian news outlet NDTV reported on the event, quoting the operator's words, “we are proud of you”. Isn't it wonderful that in difficult times even adversaries come together for the common good? This is nothing new: human history is littered with times in which arch enemies put their differences aside; from World War I soldiers coming out of their trenches to play football on Christmas Eve, to mothers and daughter in laws putting on the gimmick of a happy family on Eid.

Soldiers playing soccer in No-Man's Land during Christmas Truce in 1914. © Universal History Archive/UIG/Getty Images

It is human to act more humane when there is a greater good at stake. However, Pakistani physicist Pervez Hoodbhoy has used the current crisis to lash out at Islam once [again](#). One would think he might use his voice in a mainstream Pakistani paper to rally liberals and conservatives to work together in order to fend off the common evil, but that would be beneath him.

Before someone becomes upset with him using such a tragic moment (a time when people are gasping for air and struggling to feed their families) keep in mind that this isn't as petty as it seems. To be fair to Hoodbhoy, this

is not as bad as when he used the 9/11 attacks as an opportunity to take a dig at Islam and science. In that piece, Hoodbhoy used Imam Ghazali to drive his point home, amusingly as Asadullah Ali, pointed out, “Hoodbhoy doesn't explain how one man was capable of destroying an entire civilisation – much less how said man's supposed aversion to free will and mathematics had anything to do with [9/11](#).” After using his physics background to prove the falling of the towers was linked to Islam's lack of scientific [prowess](#) he once again found an opening to show the world his skills. At least in this current article, Hoodbhoy is using a scientific point to raise the issue of Islam's failure at science, which may be an indication that his arguments are evolving after all – albeit too gradually for even Darwinism to work.

The issue is not just his ridiculing of Islam, but also the collateral damage it has caused. He managed to misrepresent the history of science and make wildly unsubstantiated claims about evolutionary biology. As someone with a background in the philosophy of evolutionary biology, I was less than impressed with Hoodbhoy's misuse of Darwin. I was approached by several people to write a response to his article, but the idea of giving free education to Hoodbhoy on mistakes that anyone with a rudimentary understanding of the history and philosophy of evolutionary biology would not make, simply wasn't motivating enough to do so.

However, when Muhammad Umair (pictured above) of Bahria University Karachi messaged, asking me to respond, I conceded out of admiration for him. Muhammad Umair is a young Assistant Professor at the university who has been working tirelessly with his team to make improvised indigenous open-source ventilators for Pakistan. He is a hero to me, along with all others working on towards this noble goal. I am responding now as a digital salute to him and his team, in the hopes that I can also raise awareness of their work (which does need support!). Isn't it ironic that when religious bigots like Muhammad Umair are thinking about science, our Nobel prize winning physicist Hoodbhoy is thinking about religion, I guess people do show their true colours during times of crisis.

For updates on Muhammad Umair's project and to find out how you can get involved, please visit his profile: <https://www.facebook.com/muhammad.umair.7902>

Hoodbhoy's article is not just factually incorrect – it aids anti-scientific attitudes. Here are the claims that Hoodbhoy has made in his piece (some explicitly, others implicitly):

- Faith and science are rival and exclusive explanations.
- It is hypocritical of people of faith to believe in science.
- The foundation of biological science was laid by Charles Darwin.
- Darwin invented the principle of selection.
- Without Darwinian evolution, we could not understand Covid-19.
- Without Darwinian evolution, we could not develop vaccines and other medicines.
- Darwinian selection is as fundamental to biology as Newton's Law is to physics.
- Islam makes the claim that all diseases are cured through ajwa dates and black seed oil.

At first sight, it might seem odd that he has managed to make all these claims in an article so short. It should be noted, though, that he does not provide references to the aforementioned claims, nor does he make an argument that is easy to follow. He seems to have confused assertion with argumentation. In fact, even merely for the proper assertion of such arguments, he would have required further elaboration on the points he so freely made.

Before we begin dissecting, it is important for me to clarify the Islamic position on science. Muslims can and do accept and love science: regardless of whether we like a theory or find that it conflicts with our beliefs, we are still

able to accept it as a working theory, model and paradigm. In the philosophy of science, this position is formally known as instrumentalism. Even atheist academics who are critical of Darwin's mechanism of natural selection can accept it from an instrumentalist perspective. The rival camp is known as realism; they believe it's not just that theories work, but that they work and are true (with a small *t*). Both camps, however, do not believe science is absolute in any sense of giving us eternal truths.

There are two ways in which I intend to tackle what Hoodbhoy gets wrong: from the perspective of evolutionary biology, I will use Darwin and contemporary biologists; to address what he gets wrong in terms of Islam, I will use the Prophet Muhammad (peace be upon him).

Hoodbhoyian Science vs. God

Throughout his article, Hoodbhoy pits faith against science. He seems to think faith in God is incompatible with science: "Now the good news: most educated people are beginning to understand why scientific approaches work and unscientific ones don't. Better still, even ultra-conservative and science-rejecting world leaders are now begging scientists to speed up the rescue work. For all their talks about faith and calls to bang utensils and clap from balconies, they end up pleading for anti-coronavirus vaccines and drugs. Bluff, bluster and bombast have limits." Of course scientific approaches work and unscientific ones don't; that is trivial and true. But what is he really trying to say? We know he didn't simply want to convey this truism for no good reason. Taking into account the context of the 'Faith vs. science' false dichotomy that underlies his article, we see that he believes faith in God is a rival explanation to a scientific one. It is only hard-nosed, materialistic, godless, atheistic science that will find a cure, and it is hypocritical of believers in God to both have faith and also put their hope in scientific solutions. He says as much elsewhere: "A society oriented towards fatalism, or one in which an interventionist deity forms part of the matrix of causal connections, is bound to produce fewer individuals inclined to probe the unknown with the tools of science." In another instance, he openly blames the rise of faith in universities in having a negative impact on scientific learning: "In 1973 there was not a single female in burqa. Now it is hard to find a woman not wearing burqa or hijab. And of course, that has an enormous impact upon the classroom. You cannot have inquiry in a classroom where there are only burqas and beards."

He published an article on Richard Dawkins' site entitled, Is It Science or [Theology?](#) (The title is already a giveaway that he is headed in the wrong direction). In the article, he writes, "When Pakistani students open a physics or biology textbook, it is sometimes unclear whether they are actually learning science or, instead, theology. The reason: every science textbook, published by a government-run textbook board in Pakistan, by law must contain in its first chapter how Allah made our world, as well as how Muslims and Pakistanis have created science." He goes on to add, "Demanding that science and faith be tied together has resulted in national bewilderment and mass intellectual enfeeblement. Millions of Pakistanis have studied science subjects in school and then gone on to study technical, science-based subjects in college and university. And yet most – including science teachers – would flunk if given even the simplest science quiz." As disconcerting as his statements are, I don't think even Hoodbhoy believes this sweeping generalisation of the Pakistani education system. The real issue (other than the obvious brown sahib garb he is trying to impress Dawkins with) is that he has committed a category mistake; God is not a rival explanation to science; the two are complementary and distinct and do not overlap. Science is an attempt to apply reason to the natural world to see *how* it works. God is an explanation of *why* the world exists in the first place. In other words, explaining how something works does not challenge the idea of that very thing having an ultimate cause. The Quran makes a distinction between the 'how' and the 'why'. Allah says in the Quran:

Have they not seen the birds above them expanding (their wings) and contracting (them)? It is only the Lord of Mercy who holds them up: He watches over everything. (Quran, 67:19).

The 'how' in this verse is the scientific, mechanical explanation of the bird flying, its wings expanding and contracting to generate lift. The 'why' is God; God is its creator. These two explanations are mentioned in the same, singular verse and there is no contradiction in accepting them both. Oxford University Professor John Lennox further elaborates upon this distinction in his book 'God's Undertaker: Has Science Buried God?', for anyone interested in exploring it in more detail.

So then belief in God certainly is not a rival explanation to science, and faith in God does not impede scientific inquiry. A lesson may be learned from Ibn Al-Haytham who is considered to be the first modern scientist. Almost 1000 years ago, he wrote the following beautiful words to explain his deep-seated interest in science: "I decided to discover what it is that brings us closer to God, what pleases Him most, and what makes us submissive to His ineluctable Will." [1] Belief in God does not hinder people from pursuing scientific inquiry; most scientists in history were theists. Even today, there are leading evolutionary biologists like Francis Collins, who happens to be a theist, continuing to pave the way forward for science without denouncing their faith. In the Muslim world, esteemed evolutionary biologists such as the Cambridge academic Dr. Farid Khan (whom I have had the privilege of working with) have no trouble working within the Darwinian paradigm, despite a strong belief in God. In fact, Dr. Khan's journey to science was actually driven by the Quranic imperative:

Whoever saves the life of one human being, it shall be as if he had saved the whole of humankind. (Quran, 67:19).

This talk by Khan was given as part of the iERA educational program (www.iera.org), Khan is a great inspiration to young Muslims, he is of the view that Muslims need to be at forefront of science and should be racing to be the first ones to discover a new penicillin! More on Khan here: <https://uk.linkedin.com/in/farid-khan-040aaa7>

The aforementioned points are enough to challenge the very crux of Hoodbhoy's article, perhaps rendering my continuation at this point unnecessary, but bear with me. There are some deeper philosophical problems underlying his thinking that must be brought to light, at the very least in the hopes that others may be informed and avoid them. Hoodbhoy taunts believers regarding Darwin: "All beneficiaries of modern medicine should surely forgive Darwin for his supposed transgressions." What transgressions? one may ask. Many believers (including the Pakistan Prime Minister Imran Khan, whom Hoodbhoy also quotes) may say that Darwin's theory undermines God. This is the transgression that Hoodbhoy enjoys deriding believers with; luring them into the idea that any cures they may enjoy are purely from this heretic who led the world towards the light of atheism, falsely perpetuating the notion that it would be hypocritical to reap the benefits of his theory while also clinging onto belief in God. Darwin would have disagreed with both these claims.

The former claim will be addressed in the next section; for now, let's focus on the latter. Is it really the case that accepting Darwin's theory to be true and still holding onto God simultaneously is hypocritical? In stating so, he has fallen prey to the same fallacy that others before him have; namely, the distinction between methodological naturalism and philosophical naturalism. Science is based on methodological naturalism: the idea that when we look for causation in the universe, we focus strictly on natural causes and effects, not invoking God or anything relating to the supernatural. Philosophical naturalism is the belief that there really is no God or anything supernatural. The latter is a belief that atheists hold, the former is a working assumption governing the scientific process. Methodological naturalism does not entail philosophical naturalism. Evolutionary biologist Scott Todd explains this concept well: "Even if all the data point to an intelligent designer, such a hypothesis is excluded from science because it is not naturalistic. Of course the scientist, as an individual, is free to embrace a reality that

transcends naturalism.”[2] I am not going to blame Hoodbhoy for committing this fallacy. It is more than likely he has been socialised into believing it, as have many others, since the publication of the best-selling book by Richard Dawkins, ‘The God Delusion’. Publications seldom create movements and there is no doubt that Dawkins’ book led to the movement of a new firebrand atheism known as ‘New Atheism’. The problem here is that his book popularised the confusion between different types of naturalism. Philosopher of science, Massimo Pigliucci, despite being an open atheist himself, has been vocal about Dawkins’ mistake: “The fallacy lies in the fact that most people – including, alas, prominent science popularisers such as Richard Dawkins – do not make the subtle but crucial distinction between methodological and philosophical naturalism. Naturalism, broadly speaking, is the idea that there is only nature and that the supernatural realm and phenomena do not exist. As a philosophical position, it has a long history of elaboration and debate. Philosophical naturalism, then, is the strong metaphysical position that there is, as a matter of fact, no such thing as the supernatural nor a higher being, which obviously characterises any individual who considers themselves an atheist. Methodological naturalism, however, is a metaphysically more modest claim. It takes the position that while there may be a supernatural realm or being, it does not enter and need not be invoked in any discussions of scientific findings.”[3] Philosopher of biology, Elliot Sober, highlights this problem as well: “For some people Newtonian theory and Darwinian theory suggest there is no God. However, this is not what these theories say; it is a philosophical interpretation that requires additional premises.”[4] For Hoodbhoy to maintain that there is hypocrisy in believing in both God and Darwin’s theory, he has to provide a coherent argument, which he has failed to do. He repeats the same mistake by claiming there is an inconsistency in believing in scientific explanations for natural disasters and diseases while also maintaining belief in God’s will. This error is therefore not a one-off mistake; in fact, he has been consistent in repeating the same narrative in his online videos as well. I am not saying it is impossible for him to argue this case – I’m merely pointing out that he hasn’t made an argument we could assess. I would ask him, again, to not confuse assertion with argumentation.

Hoodbhoy vs. Darwin

There exists a large gap between the public and academic understanding of science. Science uses observations to create and test hypotheses and theories. God, by definition, is a being who is unseen. Therefore, any direct observation of God is impossible. In this manner, anyone making the claim that God is disproven by science is deeply mistaken. Philosopher of science Hugh Gauch explains to “insist that... science supports atheism is to get high marks for enthusiasm but low marks for logic.”[5] Although popularisers like to peddle the idea that evolution somehow disproves God, it is actually an argument that Darwin would have disagreed with. He was never an atheist and it would doubtlessly come as a surprise to him to find his theory being used as an argument against the existence of God. He wrote: “In my most extreme fluctuations I have never been an atheist in the sense of denying the existence of a God. I think that generally (and more and more so as I grow older) but not always, that an agnostic would be the most correct description of my state of mind.”[6] When the first version of his book, ‘The Origin of Species’ was published, one reviewer wrote something Darwin took to heart. He noted it would be just as noble for God to have created all species individually or create one form of life which evolved into everything else. Darwin was so impressed by these words he included them in the second edition of his book. Darwin continued to believe in God even after he had left Christianity and published his theory. Later in life he became agnostic but it wasn’t, as some may speculate, his theory that led to this change in his beliefs. He wrote: “It seems to me absurd to doubt that a man may be an ardent Theist and an evolutionist.” The link between atheism and Darwin’s theory is missing and, despite Hoodbhoy’s efforts to implicitly popularise it, it is not one that can be academically justified. On the other hand, it is necessary to remain fair and point out the error that Imran Khan has made in also creating a link between the two. Nick Spencer’s book ‘Darwin and God’ contains a more nuanced discussion on the misconception of Darwin’s atheistic views, in case anyone wishes to further explore the topic. Additionally, I had a discussion with Professor Jeremy Pritchard on this very issue of the misuse of

Darwin by popular atheists, which I would recommend viewing as Pritchard, although an atheist, acknowledges the matter.

Now, the issue here is not just that Hoodbhoy tries to subtly link Darwin with atheistic transgression (again, to be fair to him, many others have also tried this), but that he explicitly makes claims about evolutionary theory which would, frankly, embarrass Darwin. After a thorough examination of the article, it may actually be safe to say that Hoodbhoy has not read Darwin or the history of evolution in any detail. In fact, I am certain that he possesses nothing more than a pop understanding of the subject, which was made evident in the following statement from his article: "Thanks to biological science – the foundation of which was laid by Charles Darwin – the coronavirus will eventually turn out to be a deadly but controllable affair." Such a peasant view of Darwin could be expected of old soviet materialistic literature, leaving one wondering, what on earth is he talking about? Darwin did not lay the foundations of biological science. To give evidence for this would be to belittle the intelligence of the reader. If Hoodbhoy has his doubts on the matter, let him consult any high school science textbook (even a Pakistani government sanctioned one will do). Drugs, vaccines and even the study of pathogens had been explored and utilised before Darwin. Furthermore, evolutionary biology is largely ignored in medicine as the founder of evolutionary medicine, American physician Randolph Nesse, points out: "Evolutionary biology is an essential basic science for medicine, but few doctors and medical researchers are familiar with its most relevant principles. Most medical schools have geneticists who understand evolution, but few have even one evolutionary biologist to suggest other possible applications. The canyon between evolutionary biology and medicine is wide. The question is whether they offer each other enough to make bridge building worthwhile." [8] On a side note, my dissertation (which is due to be published soon inshaAllah) actually argues in favour of evolutionary thinking in medicine. I think Nesse is spot on and for far too long there has not been a sufficient integration.

Hoodbhoy again shows his misunderstanding of biological evolution by claiming that we could not deal with the evolution of viruses without Darwin's theory, as he says, "Without Darwinian selection one can't even begin to understand microbial-host interaction, the evolution of pathogens, or start developing drugs and vaccines. So go ahead and blame Darwin for inventing the notion that only the fittest survive." Here, he has simply confused Darwinism with evolution, falling for the fallacy of equivocation. Of course, it is possible to understand virus evolution without Darwin. There is a clear distinction between evolution and Darwin's theory of evolution (also known as Darwinism). On a public level, these terms are often thought to be interchangeable (so Hoodbhoy should not be blamed) – academically, they are not. Evolution and Darwinism are distinct; as a matter of fact, the concept of non-Darwinian evolution also exists and has actually been the subject matter of academic books such as 'The Eclipse of Darwinism: Anti-Darwinian Evolution'. So what is the difference between the two? Evolution, as a general concept, means 'biological change over time' and has been known, written, documented and theorised about for at least three thousand years. References to biological change over time can be found in documents traced back to ancient civilisations ranging from ancient China to the ancient Brahmins in India and the ancient Greeks. But there is a difference between generally believing in biological change over time – which is an undeniable observation – and Darwin's theory of evolution. Half a century before the publication of 'The Origin of Species', a French biologist named Jean Baptiste Lamarck published a comprehensive theory of evolution comprised of two distinct parts; a history of evolution and a mechanism of evolution. The history of evolution involved multiple endless origins of life with parallel lines of evolution taking place, and a mechanism of inheriting acquired characteristics. Darwin, in 1859, published another theory of evolution which was different to that of Lamarck's. Its history involved a total paradigm shift; instead of multiple lines of parallel evolution, he highlighted the concept of only one origin, a tree of life and the mechanism of natural selection.

A group of evolutionary biologists that challenge Darwinian theory have brought forward a project known as the 'Third Way of Evolution'. The project comprises of biologists from North America and Europe, and extends as far as China. These biologists stem from such prestigious universities as Oxford, Cambridge, Princeton, Harvard and

MIT. They explain their stance as: "The vast majority of people believe that there are only two alternative ways to explain the origins of biological diversity. One way is Creationism that depends upon intervention by a divine Creator. That is clearly unscientific because it brings an arbitrary supernatural force into the evolution process. The commonly accepted alternative is Neo-Darwinism, which is clearly naturalistic science but ignores much contemporary molecular evidence and invokes a set of unsupported assumptions about the accidental nature of hereditary variation. Neo-Darwinism ignores important rapid evolutionary processes such as symbiogenesis, horizontal DNA transfer, action of mobile DNA and epigenetic modifications. Moreover, some Neo-Darwinists have elevated Natural Selection into a unique creative force that solves all the difficult evolutionary problems without a real empirical basis. Many scientists today see the need for a deeper and more complete exploration of all aspects of the evolutionary process." [9] These biologists clearly need guidance from Hoodbhoy as they blasphemously think evolutionary theory can work without Neo-Darwinism.

Following is a brief exploration of three evolutionary alternatives to Darwinian evolution:

- **Evolution by Natural Genetic Engineering (ENGE)**

According to the standard Darwinian theory, randomness of mutations is the clay that natural selection moulds into all sorts of novel species. Though the concept has been explored in numerous popular publications and documentaries, some evolutionary theorists claim there is a lack of evidence for random mutations making anything useful. One such biologist is James Shapiro, who challenges this central pillar of Darwinism, by using contemporary research in mutations to make a completely new evolutionary paradigm. In 'Evolution: A View from the 21st Century', Shapiro explains why ENGE may be a better model than Darwinian Evolution.

- **Neo Lamarckian Evolution**

Although Lamarck was largely overlooked for a long time, biologists have recently begun to revisit his ideas and developed a revised theory under the name of Neo Lamarckian evolution. Proponents of this theory argue that the inheritance of acquired characteristics is what drives evolutionary change, citing recent studies to support their view. Neo Lamarckian evolution views the process in terms of rapid evolutionary transitions instead of slow, incremental changes. Evolutionary biologist Eva Jablonka outlines this alternative view in her book, 'Transformations of Lamarckism.'

- **Mutation Driven Evolution**

Mutationism also opposes the theory of small incremental steps, instead assuming evolution to be driven by large mutations. This mechanism challenges the idea of Darwinian gradualism and natural selection as the driving forces behind evolutionary change. Although mutationism was, for the most part, discarded several years ago, a rehashed version has been proposed recently by evolutionary biologist Masatoshi Nei, who is a well-known, respected and award winning scientist. His work in the field of population genetics has been used widely and his book, 'Mutation Driven Evolution' shows how developments in molecular biology are challenging Darwinian predictions, further elaborating on how a new alternative may work.

Allow me to clarify an important point; I did not mention these alternative evolutionary models to argue in their favour. Rather, my intention is to simply convey how it is possible, and coherent, to understand the evolution of viruses without Darwin. When considering Hoodbhoy's understanding of the matter, one is forced to conclude that not only has he not read Darwin but perhaps he has not read the works of his mentor the 'right honorable gentleman' Sir Richard Dawkins, as the latter explicitly states the possibility of evolutionary science continuing without Darwin: "We must acknowledge the possibility that new facts may come to light which will force our successors of the twenty-first century to abandon Darwinism or modify it beyond recognition." [10] It gets worse; Hoodbhoy not only misunderstands the difference between evolution and Darwinism, but he has also not managed to grasp what the concept of Darwinian selection really is. Darwin did not 'invent' the idea of survival of

the fittest; it had been known and documented since ancient times. Almost 2000 years ago, Empedocles noted that nature generates a large variety of organisms randomly, of which only those who manage to provide for themselves and reproduce successfully persist. Throughout history, thinkers have explored and developed the idea of the fittest surviving and that in nature, organisms struggle for existence. Had Hoodbhoy read the 'Origin of Species', he would have known that Darwin acknowledges those who theorised on the matter before him and even explicitly mentions contemporaries such as Edward Blyth, who developed ideas on selection. What makes Darwin and Alfred Russel Wallace (who Hoodbhoy did not mention) unique is that they both arrived independently at the conclusion that natural selection is not just a process of filtering, but a major creative force. To understand these nuances and other important historical evolutionary developments, I would recommend Stephen J Gould's excellent book, 'The Structure of Evolutionary Theory'. Anyone who indulges in the careful examination of theories of evolution proposed throughout history, would see it is evident that selection may very well be utilised under non-Darwinian evolutionary models, as well as applied to the study of viruses, despite claims to the contrary that Hoodbhoy has so ardently made. Even if Darwin was the only person who came up with selection and all the other developments (which he credited to others), this still would not support Hoodbhoy's claim that it is hypocritical for theists to utilize his theory to tackle viruses. In the same way it is not hypocritical for atheists to rely on science even though historically it was a theistic invention.

Hoodbhoy vs. Islam

Over the years, Hoodbhoy has revealed an open animosity towards Islam. It is no secret that he openly challenges and mocks Islam and Muslims. A clear example of this is evident in his discussion with the Muslim public intellectual Hamza Tzortzis.

Now, the aim of this article is not to challenge him on his hatred of Islam. On the contrary, I merely want him to commit to the same scientific spirit that Darwin and those before and after him have exhibited. Scientists are supposed to be committed to working toward the common good; science being a common denominator for people of varying beliefs, values and cultures. In attempting to confine science within the bounds of naturalism, misrepresenting Darwinian evolution and attacking Islam, Hoodbhoy is only fuelling anti-scientific behaviour.

Hoodbhoy claims that Muslims have spread the virus by not following basic scientific guidelines. On principle I find myself agreeing with him in the sense that no one should be carrying out any actions that could further the spread of Covid-19. If Hoodbhoy was sincere in his attempts to warn of the virus, he could have pointed out that Islam recommends quarantining, instead of attacking Muslims and blaming their faith in black seed oil and prayer. Having lived in a Muslim country for so many years, has he not heard the hadith: "If you hear of an outbreak of plague in a land, do not enter it; if the plague breaks out in a place while you are in it, do not leave that place." The dissemination of such information may have helped in improving the situation and would be more likely to positively influence the behaviour of the aforementioned Muslims. It is also important to question his singling out of the Muslims when there are plenty of non-religious people who are churning out anti-scientific conspiracy theories linked to 5G and attending secular events such as matches, conferences and weddings even after the outbreak of the virus. Why does he consistently turn a blind eye on the secular community, pointing fingers only at religion and accusing religious people of being anti-scientific? Hoodbhoy should know better than to make such accusations, as the adage goes: pointing one finger has three pointing back at you. Over the years, his fellow atheist socialists have shown resistance to science and promoted pseudoscience^[11]. It should not be this difficult for Hoodbhoy to acknowledge that secular atheists can deny science in the same way that some Muslims can, so perhaps it is time to retire the card of portraying only all religious people as anti-scientific. Hoodbhoy's attempts to vilify Islam are, to some extent, rather amusing to witness. His favourite way of mocking Islam appears to be through the proxy of Moulvis. In this case, he quotes Maulana Tariq Jameel on the subject of the virus. Since I am not aware of the exact words the Maulana used, I will go along with Hoodbhoy's rendition of

the situation, in which the Maulana said that all diseases, including Covid-19, can be cured with Ajwa dates. Hoodbhoy says, "On our side of the border we have yet to order a shipload of Ajwa-Khajoor (dates from Ajwa in Saudi Arabia) touted as a cure for all diseases by Maulana Tariq Jameel, Pakistan's most popular preacher and a staunch Imran Khan ally. Nor is the government arranging sacrifices of a million kala bakras or mass importing olive oil and kalonji." To put it lightly, this is nonsense. The beliefs perpetuated and mocked here are exaggerated and out of touch with reality. The classical scholarly understanding is that some medicines such as black seed oil, Ajwa dates and honey, should be used on a regular basis for general health; however, this is supposed to be in addition to a search for individual cures to particular diseases. In other words, these prophetic medicines are complementary, not exclusive, of other medicines.

If any one of these was truly believed to be the cure for all diseases, then the Prophet (peace be upon him) would not have encouraged the search for cures for diseases as explicitly as he did: "Seek treatment, O servants of God, for Allah did not create a disease except that He created for it a cure." In another narration, he added, "Whoever knows it, knows it, and whoever does not know it, does not know it." If Ajwa dates or black seed oil were to cure all diseases including the plague, why was this not known by the companions of the Prophet (peace be upon him). Consider the following incident: Umar ibn al-Khattab (RA) went out to Syria until he arrived at Sargh. The commanders of the army, Abu 'Ubaydah ibn al-Jarrah and his companions, met him and told him that an epidemic had befallen the land of Syria. Umar announced to the people, "I will turn back in the morning, so you must as well." Abu 'Ubaydah said, "Are you fleeing from the decree of Allah?" Umar responded, "Would that another had said so, O Abu 'Ubaydah! Yes, we are fleeing from the decree of Allah to the decree of Allah. Do you not see that if you had camels descending in a valley with two fields, one of the fertile and the other barren, you would graze in the fertile field by the decree of Allah or you would graze in the barren field by the decree of Allah?" Why, if Hoodbhoy's view of medicine in Islam is to be believed, did Umar (RA) not turn around and inform his army that the plague could be defeated simply using ajwa dates or black seed oil or honey? The answer is clear: he and the other companions understood that each disease has a cure and Allah heals whom He wills. This is certainly not the first time that Hoodbhoy has made a strawman argument, proceeded to knock it down and seemed quite pleased with the outcome – and it doesn't seem like it will be the last.

Attacking Islam, alongside Muslims and their practices and beliefs, has been a part of Hoodbhoy's narrative for well over three decades (see his book, 'Islam and Science: Religious Orthodoxy and the Battle for Rationality'). In spite of this longstanding commitment, the arguments even then were not his own; he has been recycling orientalist fables that paint Islamic creed as incompatible with science and propagating the idea that Islam was not the cause of scientific progress in the Muslim world. Despite the fact that both of these claims have been thoroughly debunked (see Asadullah Ali's article on the matter[12]), Hoodbhoy has not stopped repeating them.

It may be proposed that Hoodbhoy needs to embrace the findings of evolutionary psychology. Even if he believes religions are false, he needs to question the reason behind their persistence. According to the evolutionary process, truth has no intrinsic value; it matters not whether a belief is true or false, rather if it serves to enhance our evolutionary fitness. Evolutionary psychologists have argued that religion survives due to its adaptive value, in that it reduces stress, increases life expectancy, increases reproductive success and social cohesion[13]. In the words of evolutionary psychologist Bret Weinstein, "religion is literally false but metaphorically true." [14] There is irony in the paradox, then, that Hoodbhoy wants to attack religious people for denying natural selection when it is the very reason why they deny it in the first place. As a philosopher of biology Alex Rosenberg points out: "The hypothesis that organised religion has adaptive functions for people and groups is backed up by a fair amount of evolutionary human biology. It couldn't have done so except through the false beliefs it inculcates. Of course, all the religious beliefs that natural selection foisted on people made acquiring scientific truths about the world much more difficult." [15] Hoodbhoy needs to adopt Darwin's pragmatic, scientific spirit of working with those who hold opposing views even if they are from the opposing theological spectrum; Asa Grey and Darwin had cordial,

friendly working relationship, despite the differences in their belief in God, with Grey being a firm Bible-believing Christian. Hoodbhoy, similarly, should not attack Islam and instead recognise its adaptive value. It would be beneficial for him to work with the likes of Muhammad Umair to save lives during this difficult time, instead of attacking people for beliefs they hold by design of natural selection. Don't attack Muhammad Umair for his religious views and scientific work, he is genetically determined to help save lives, in-fact this is not due him selfishly wanting to increase his inclusive fitness, rather his behaviour is probably better explained by the Neo-Darwinian idea of reciprocal altruism. Hoodbhoy's behaviour is maladaptive but it is not contagious (though self-isolation is still recommended), Umair and other religious bigots will keep working and I hope this article makes them happy. Happiness after-all is a proximate mechanism to help us with our evolutionary goal, the goal that Dawkins calls the ultimate rationale of human life, the preservation of our genes[16]. So things come full circle, I too have contributed to the saving of lives, I hope so anyway.

So what did Hoodbhoy get right? Well there is good news and bad news, bad news first, he got evolution wrong, history wrong, philosophy of biology wrong, Darwinism wrong and Islam wrong, now the good news, we should take comfort in knowing he got something right: "Bluff, bluster and bombast have limits." Indeed!

May Allah bless the soul of the martyr Dr Osama Riaz who despite his Pakistani education managed to do a fine job, you make us all proud Osama, you did well indeed.

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[9] <https://www.thethirdwayofevolution.com/>

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[16]<https://www.independent.co.uk/voices/commentators/richard-dawkins-our-big-brains-can-overcome-our-selfish-genes-9263389.html>

Further Information:

Islam and Science: Debunking Orientalists' Fables

<https://www.youtube.com/watch?v=tzLDA3UDw3M>

<https://www.youtube.com/watch?v=tzLDA3UDw3M>

Islam, Evolution and Darwinism

https://www.youtube.com/watch?v=1_IoCUNo7FE

Islam and Evolution: The Texts & Stakes

<https://www.youtube.com/watch?v=OAVVgGanguE>

Islam under the Darwinian Lens

<https://www.youtube.com/watch?v=3v3XrQLxPhQ>

Should Muslims Believe In Evolution?

<https://www.youtube.com/watch?v=zFcuDuvlu1g>